FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 822. (No. 39, Vol. XVI.) SEPTEMBER 25, 1924 [Weekly, Price 6d. Post free, 7d.

Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C. 2
Telegrams: Truditur, Westcent, London. Telephone: Gerrard 1828
Annual Subscription Rates, Post Free:
United Kingdom .. 30s. 4d. Abroad .. .. 33s. 0d.*
These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates
* *European subscriptions must be remitted in British currency*

CONTENTS

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :—

1924

Sept. 27–28 Eliminating Tests for Light 'Plane Competition at Lympne.

,, 27–Oct. 8 Wireless Exhibition at Albert Hall, Kensington.

,, 29–Oct. 4 2-Seater Light 'Plane Competition at Lympne.

Oct. 2 .... Aero Golfing Society. Autumn Meeting, at Moor Park Golf Club, for A.G.S. Challenge Cup presented by Cellon (Richmond) Ltd.

,, 2 .... Lieut.-Col. H. T. Tizard, A.F.C., F.R.Ae.S. (of the Department of Scientific and Industrial Research), Chairman: Inaugural Lecture.

EDITORIAL COMMENT.

IT would be difficult to imagine anything better calculated to impress upon Europe the qualities of British aircraft than the magnificent flight made by Mr. Alan J. Cobham, the famous de Havilland pilot, on Friday of last week. Leaving London in the morning, he landed, in his de Havilland machine, the D.H. 50, in Northern Africa just before sunset. What the flight means is that, given an efficient machine, a reliable engine, and last, but by no means least, a pilot who combines the qualities of a first-class pilot, an experienced navigator, and a good engineer, it is possible, even as late in the "summer" as this, to leave London in the early morning and arrive before nightfall at some place situated at least 1,000 miles away. The actual distance covered by Mr. Cobham was 1,300 miles, but he was travelling south. If we take the figure at 1,000 miles, it should be possible to cover this distance in any direction. Very roughly, this would mean that any one of the following places would be brought within one day's journey of London: Trondhjem, Stockholm, Koenigsberg, Warsaw, Budapesth, and Rome. Actually this is, in most cases, understating the case, but it does show that a determined pilot can take his passengers to very far-flung places within one day's travel of London, and indicates what developments may be possible in the near future. It is somewhat curious that it should be left to a private pilot flying an unsubsidised aeroplane, without special ground organisation other than that already existing, to show the way which our new million pound monopoly company should follow. Let us hope that the lesson will be taken to heart, and that some really serious experimental and development work will be instituted without delay.

London to Africa in a Day

As regards the flight itself, there is little to add to the account given elsewhere in this issue of FLIGHT. The machine is one of the D.H. 50's with 230 h.p. Siddeley "Puma" designed last year and completed just before the Gothenburg Aero Show. The machine was then flown to Sweden, it may be remembered,

and won first prize in the air traffic competition. This year the same type of machine, but fitted with wing flaps, flew to Prague for the Aero Show there. In Australia, Col. Brinsmead flew no less than 8,000 miles around Australia in 25 days, also on the D.H. 50, and the King's Cup Race was won by Cobham on the same type, Incidentally, it may be mentioned that not only was the Siddeley "Puma" the same engine, as supplied by the Aircraft Disposal Co., used in the King's Cup Race, but it had not been overhauled, an examination showing that this was not needed. Further comment is, surely, superfluous.

To the pilot in the first place must be given due credit for the magnificent performance, but it goes without saying that had he not been mounted on a good machine and seated behind a reliable engine, the flight would not have been possible, so that the firms concerned share with the pilot the glory of the achievement. By his flight, Cobham has done a tremendous amount of good in enhancing the prestige of British aircraft and aero engines, and for that he deserves the thanks of the whole British aircraft industry.

* * *

The Light 'Plane Competitions

It is with a certain amount of pride that we call attention, in these notes, to the Editorial pages of this week's issue of FLIGHT. Not only is this the largest issue we have brought out since the War, but never before in the history of aviation has any aeronautical journal published in advance, such a full account of all the machines taking part in a competition. That this has been found possible is, of course, in the first instance, due to the helpful co-operation of the firms concerned, and for that we would take this opportunity of thanking them. But for the information unstintingly (in most cases) given, it would have been impossible, with the best intentions in the world, to have got together the data and illustrations which we are able to present to our readers this week.

We are not without confidence that the September 25, 1924, issue of FLIGHT will be filed away for reference by readers all over the world, and that whenever the subject of light 'planes arises, they will automatically turn to FLIGHT for any information relating to British light 'planes. The advantage of having all the descriptions, illustrations and data collected together in a single issue can scarcely be exaggerated. If and when the light 'plane comes to be the popular vehicle which its supporters anticipate, the fact that Britain undoubtedly leads in this particular field of aeronautical endeavour, whatever may be the position in certain other respects, will of necessity result in potential customers abroad no less than at home making inquiries from British firms first, and then the full advantage of a collected account of all the machines will be felt. We, therefore, think that those who have so generously supported us in the production of this issue of FLIGHT will have no cause for regret, and we have made it a policy that whenever we bring out a special number, it shall be one of real merit. That the present issue conforms to this rule we trust all will admit.

With regard to the competitions themselves, the success or otherwise will largely depend upon two factors—the weather and the engines. It may so happen that the former will at last be kind, especially as the competitions are for prizes offered by the Air Ministry, whose task it now is to give us the weather we deserve. A few days of calm weather without fogs will do a great deal towards the success of the Lympne week, and should we be fortunate enough to get such days some very fine performances will, we are satisfied, be put up by the very excellent machines entered for the competitions.

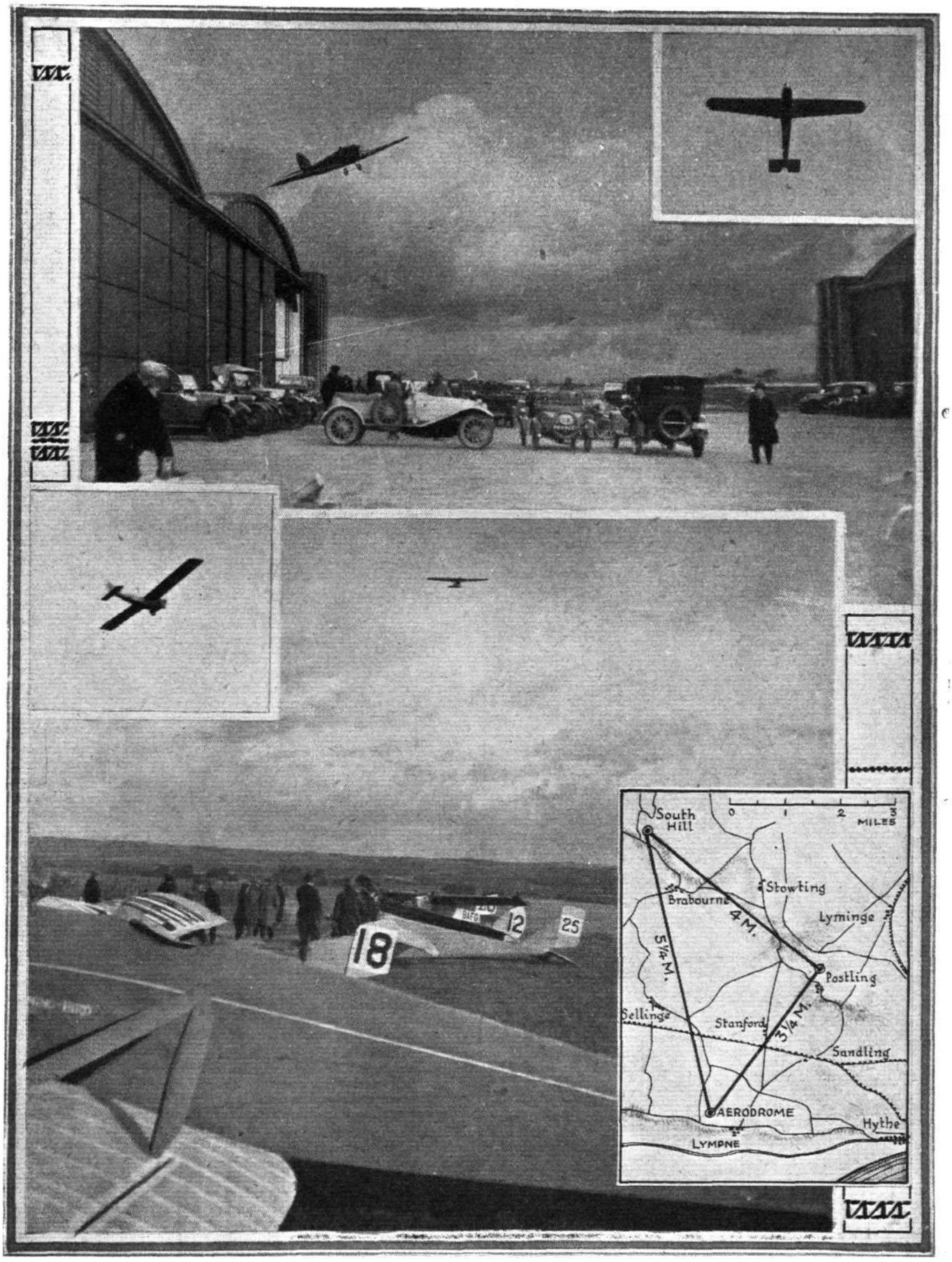
The engine question is no less important, and, as we have repeatedly pointed out, the tests to which these little power plants will be subjected are extremely severe, considering that there has been very little time in which to develop new types, and that the engine capacity has been limited to a figure which is generally considered to be rather inadequate. In fact, if there were such an institution as a society for prevention of cruelty to engines, it would undoubtedly step in and on "humane" grounds prevent the competitions from being held. On the other hand, any engine which gets through the Lympne week without serious trouble will have put up a performance which should cause it to be regarded all over the world as a very excellent engine, and so the severity of the tests may prove a blessing in disguise, whatever may be one's feelings in the matter beforehand.

The machines are, almost without exception, excellent examples of the aircraft constructor's art. The workmanship and finish are beyond reproach, and are, we incline to think, if anything, too good. The cost of some of the machines must have been rather prohibitive, due mainly to the fact that the competition is a severe test of efficiency, and that consequently every ounce of weight counts. Thus the machine designed to be cheaply produced would be severely handicapped from the start, and this fact doubtless accounts for the painstaking care bestowed upon the detail construction.

Aerodynamically it is to be feared that, generally speaking, there is little of originality. This is not meant to be a criticism, and is probably mainly due to a desire on the part of designers to avoid the introduction of too much experimentation in a competition.

Further development work, both with cheaper forms of construction and different aerodynamic design, will come later. The result is that ten out of the eighteen machines entered are perfectly normal tractor biplanes with external bracing (although attempts have certainly been made to reduce this to a minimum). The other eight machines are monoplanes, and the various forms of monoplanes are represented, such as the normal, the high-wing, the low-wing, and the parasol. Thus the competitions should help materially towards settling the question of monoplane *versus* biplane. As a matter of fact, it seems doubtful whether, taking it all round, there is much to choose between the two, although for ultra-efficiency there is little doubt that the monoplane holds the field. The preponderance of biplanes in the competitions is due mainly to the fact that a premium is placed on low speed.

Whatever happens, always excepting impossible weather conditions, the week at Lympne is sure to be a most interesting one, and it should, we think, result in considerable addition to our present store of knowledge and experience. It may be that no very outstanding performances will be put up, but, at the same time, we are not without hope that a few machines, at least, will be something in the way of surprises as to what can be done with low power by scientific design.



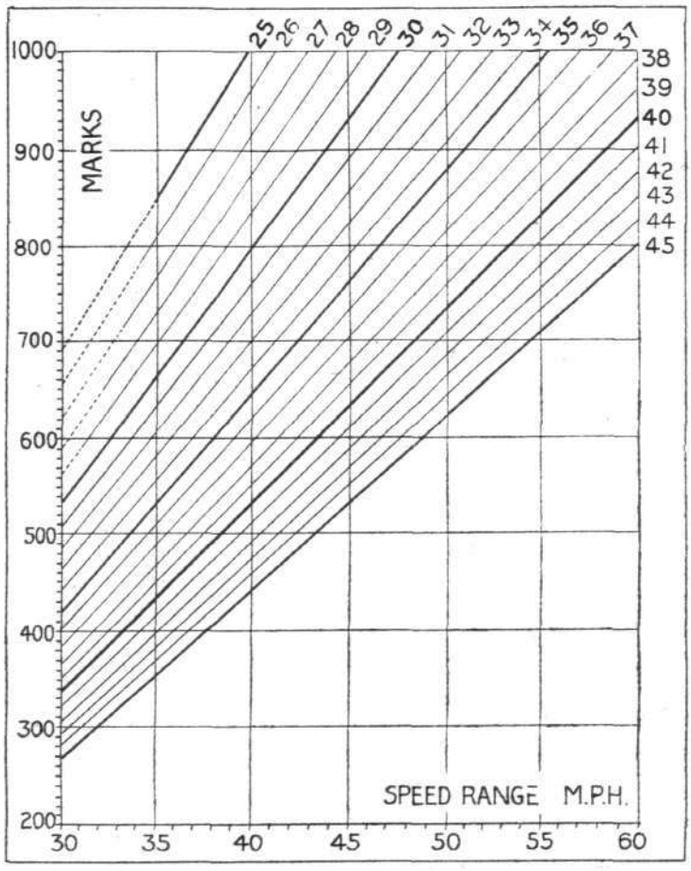
REMINISCENCES OF LAST YEAR'S LYMPNE COMPETITIONS: The upper photograph shows Mr. Broad flying the de Havilland 53, while the inset is a view from underneath of the "Wren" on which Longton tied with James for the consumption prize. The lower picture shows Hinkler flying the Avro monoplane on which he covered a distance of 1,000 miles during the week, while inset is the A.N.E.C. monoplane on which James tied with Longton. The small sketch-map shows the triangular course over which this year's high-speed tests will be flown.

TWO-SEATER LIGHT 'PLANE COMPETITIONS AT LYMPNE

BRIEF SUMMARY OF PRIZES AND REGULATIONS

THE competitions for two-seater light 'planes, which commence on Monday of next week, September 29, and last till October 4, are a direct result of an offer, by the British Air Ministry, of prizes totalling £3,000 for the best performance in the competitions, the regulations having been drawn up by a Committee of the Royal Aero Club, upon which representatives of the Air Ministry were present. The trials are being held under the competition rules of the Royal Aero Club, in whose hands is the entire organisation of the meeting. In addition to the main Air Ministry prizes, several bodies and individuals have offered substantial encouragement in the form of money prizes, details of which will be found below. The object of the Air Ministry was the production of machines suitable for school work.

Prizes to the following amounts are being offered: £3,000 presented by the Air Council; £500 by the Duke of Sutherland; £150 by the Society of Motor Manufacturers and Traders; £150 by the British Cycle and Motor-Cycle Manufacturers' and Traders' Union, and £100 by Captain C. B. Wilson, M.C.—a total of £3,900.



SPEED-RANGE AND THE AWARD OF MARKS: This graph shows at a glance the number of marks that will be awarded for speed-range. The figures marked against the curve relate to the slow speed, so that when this and the top speed are known, the number of marks can be read off directly. Thus, if the slow speed is 30 m.p.h. and the top speed 70 m.p.h., the speed range will be 40 m.p.h., and the number of marks awarded will be 800. The dotted portion of the upper curves refers to a speed range so low as to fail to bring the top speed up to the minimum of 60 m.p.h. stipulated.

The Speed-Range Formula

The greater proportion of the prize money is offered for speed-range, competing machines being judged on a basis provided by the following formula:—

$$\frac{V_{max.} - V_{min.}}{V_{min.}} - 0{\cdot}333,$$

in which $V_{max.}$ is the maximum speed and $V_{min.}$ the lowest speed in miles per hour at which the machine is able to fly. Marks will be awarded for speed-range, but it is stipulated that the maximum or top speed must not be less than 60 m.p.h. while the minimum speed must not exceed 45 m.p.h. No percentage figure for speed range lower than 33·3 per cent. will be accepted, and 8 marks will be awarded for each 1 per cent. over 33·33 per cent., and parts of 1 per cent. *pro rata*. The percentage figure is the range of speed expressed as a percentage of the low speed. Thus, if the top speed is 70 m.p.h. and the low speed 30 m.p.h. the speed range is 40 m.p.h., or 133·3 per cent. Before any marks are awarded 33·33 per cent. must be deducted from this figure, giving 100 per cent., and the number of marks awarded would be 800.

In order to show how this award of marks for speed-range will operate, we have prepared the accompanying graph, in which the figures marked against the straight-line curves represent the low speed, plotted on a base of speed-range in m.p.h. From this graph the number of marks awarded for any given performance can be read off directly. The £3,000 offered by the Air Council will be awarded for speed-range, and for getting off and pulling up, £2,000 for the machine obtaining the greatest aggregate of marks in these tests and £1,000 for the aeroplane which is placed second.

Getting-Off and Pulling-Up Competitions

It has been mentioned that some of the Air Ministry awards will be for getting off and pulling up. No distinction as to the proportion is made in the rules, but the marks awarded in this competition will be added to those obtained in the speed-range competition and the award made according to the total number of marks. In addition, the prize of £500 offered by the Duke of Sutherland will be awarded to the machine obtaining highest marks in getting off and pulling up, while Capt. Wilson's prize of £100 will be awarded for the machine classed second. As in the case of the speed-range competition, the awards in the getting-off and pulling-up competitions will be made according to marks obtained. Briefly this competition will consist of starting from rest and clearing a barrier 25 ft. in height in the shortest possible distance, 1 mark being awarded for every yard by which the distance is less than 450 yards. The pulling up competition is somewhat similar in that competitors will be required to make a straight landing across a barrier 6 ft. high and coming to rest in the shortest possible distance beyond the barrier, 1 mark being awarded for every yard by which the distance required to come to a standstill is less than 150 yards.

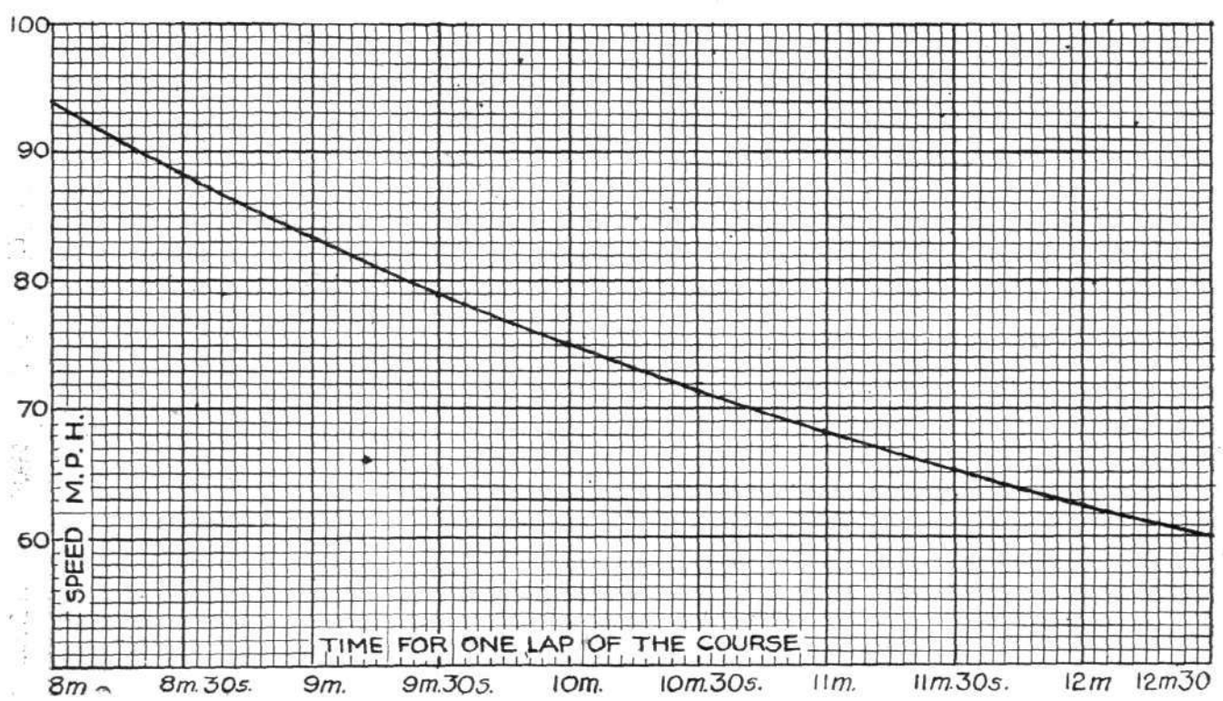
Reliability Trials

The two prizes of £150 each, offered by the Society of Motor Manufacturers and Traders and by the British Cycle and Motor-Cycle Manufacturers and Traders' Union respectively, will be awarded for the aeroplane which flies the greatest number of circuits of the course during the period of the competitions, with a minimum of 400 miles. Circuits flown

in the other competitions will count towards these prizes. Finally it is stipulated that, in order to be eligible for the prizes, machines must fly at least 10 hours during the competitions.

Manner of Carrying Out the Speed Tests

The high-speed test will be carried out over a triangular course in two separate flights of 75 miles each. An interval will be allowed between the two flights for taking in fuel and oil only. The length of the triangular high-speed course will be 12½ miles, the turning points being at Postling and South Hill. Thus each flight in the high-speed test will consist of 6 laps of the triangular course. In order to enable visitors to Lympne during the competitions to estimate rapidly the speed of each competitor in these tests, we have prepared the accompanying graph, in which a curve of speed in m.p.h. is plotted against time occupied (in minutes and seconds) for each lap of the 12½ miles' course. Thus, if a certain machine takes 10 minutes to complete one lap its speed over the course is 75 m.p.h. The curve does not give great accuracy, but as timing by amateurs is not likely to be particularly exact either, it is not thought that this will matter greatly. It may be mentioned that the triangular course has been so laid that (in clear weather at any rate) the machines will be in sight the whole time. There is no restriction on the number of attempts that may be made, but each attempt must consist of two sets of six laps each.



Speed-time chart for ascertaining speed made by competitors around triangular course at Lympne.

The low-speed tests will be carried out over the Lympne aerodrome, up and down a straight course of not less than 500 yards in length. The width of the course will be 25 yards, and will be indicated by red flags placed at intervals on each side. The course must be covered twice in each direction, and machines must fly at a constant height of not more than 20 ft. above the ground. The speed of each of the four flights will be taken, and the average of the four speeds will constitute the performance. In this test all competitors will be allowed an equal number of attempts.

Eliminating Trials

Eliminating trials will be held on Saturday, September 27, and Sunday, September 28. In these, the machines have to be presented to the officials fully erected and must then be dismantled or folded in such a manner as to permit of being completely transported in one journey over a distance of not more than 25 yards, and placed in a shed 10 ft. wide. The machines must then be taken outside the shed and re-erected. Two persons only will be allowed to handle the machine, and the time occupied must not exceed two hours. After passing the dismantling and erecting tests the machines must give a demonstration of being capable of being piloted from either seat. In this test the pilot of a machine must fly one complete circuit of the course while seated in the front seat. On returning, one figure of eight must be flown within the boundaries of the aerodrome. The pilot then transfers to the other seat and repeats the performance of flying over the course and doing another figure of eight.

The Effect of Wind

It is not always realised that in tests of this sort the question of wind plays an important part. For instance, over the triangular course of the high-speed test, a wind of 10 or 15 miles per hour will seriously reduce the average speed over the course, and competitors will, therefore, attempt, as far as possible, to do their high-speed test in calm weather.

For the low-speed test, on the other hand, wind will be of no importance provided the course can be arranged parallel with the wind. The machines will be timed up and down the course, and their speed on each lap taken. The average speed then represents the actual speed of the machine, and will be the same as the speed in still air. This is because the *average speed* and *not the average time* is taken. If the course cannot be arranged to be parallel with the wind direction, then wind *will* affect the results, most so when the wind is at right angles to the course, when the effect will be to give a lower average speed than the actual low-speed in still air.

In the getting-off and pulling-up competition, wind also will play a most important part, and it is essential that either these tests be carried out in a calm or, if that be impossible, that all competitors make the tests under identical wind conditions.

No Fixed Time-Table

From the general interest point of view, it would, of course, have been preferable if the various tests could have been run off according to a fixed time-table. From what has been said in the foregoing, however, it will be realised that these trials are to be regarded as scientific experiments rather than as sporting events, and that to ascertain as accurately as possible the actual performance of each machine is the first aim and object of the competitions. The general public will, it is hoped, realise this fact, and not feel unduly disappointed if on certain days of the week there might appear to be less of sporting interest than could have been desired. The weather will play a very important part, and if the Lympne week should by chance happen to be reasonably well favoured there will always be plenty of flying to watch. The stipulation that machines must, in order to be eligible for the prizes, complete at least 10 hours' flying during the week should ensure this. In any case, the tests to be carried out are so numerous that, except for impossible weather conditions, there should be few hours on each of the six days when there is not something to keep the interest alive. It might be mentioned that no flying in the competitions will be officially observed before 10 a.m. or after 6 p.m.

THE MACHINES TAKING PART

IN the following pages, as well as in the accompanying table, will be found as full particulars of all the competing machines as it has been possible to collect. In the table the machines have been arranged in the order of entry—*i.e.*, according to the numbers carried in the competitions. In the descriptive articles, however, they have been arranged alphabetically according to the titles of the constructional firms. The figures in the column of the table headed "Page" refer to the page number on which the description of the particular machine will be found. Thus, whether it is desired to refer to the description of a machine carrying a certain number in the competitions or to one the make of which is known, the table should prove valuable as an index no less than on account of the technical data which it contains. We should like to point out that although every care has been taken in compiling the table, it is possible that in one or two instances the engine given may be wrong. This is due to the fact that at the time of going to press with this week's issue of FLIGHT, some of the competitors have not yet definitely decided which engine to fit. Most of the machines were, we believe, originally designed for the Bristol "Cherub," but some have, for various reasons, been fitted with engines of different make. This change may also, in a few cases, have resulted in a slight change in the figures for weight loaded and weight empty, but, generally speaking, these figures will be found fairly exact.

TABLE OF PARTICULARS OF LYMPNE LIGHT 'PLANES.

No.	Name.	Entrant.	Pilot.	Type.	Page.	Length o.a.		Span.		Wing area.	Weight empty.	Weight loaded.	Engine.	Drive.
						ft.	in.	ft.	in.	sq. ft.	lbs.	lbs.		
1	Brownie I. ..	Bristol Aeroplane Co.	Uwins .. Campbell	M	596	26	3	36	7	178	500	870	Br. C.	D.
2	Brownie II. ..	Bristol Aeroplane Co.	Barnwell ..	M	596	26	3	34	7	172	500	870	Br. C.	D.
3	Cranwell ..	Cranwell Light 'Plane Club.	Comper .. Mackay	B	599	23	3	29	8	223.5	515	890	Br. C.	D.
4	Wee Bee I ..	William Beardmore & Co., Ltd.	Piercey ..	M	591	22	2	38	0	187	462	837	Br. C.	D.
5	Wood Pigeon	Westland Aircraft Works.	Winstanley	B	620	19	6	22	9	155	439	779	Br. C.	D.
6	Widgeon ..	Westland Aircraft Works.	Gaskell ..	M	624	21	0	30	8	145	475	815	Bl.	D.
7	A.N.E.C. II. ..	Air Navigation & Eng. Co., Ltd.	James ..	M	589	20	8	38	0	185	387	730	A.	D.
8	Satellite ..	Short Bros., Ltd.	Parker ..	M	611	23	9	34	0	168	483	850	Br. C.	D.
9	Sparrow ..	Supermarine Aviation Wks., Ltd.	Biard ..	B	615	22	8	33	4	256	475	860	Bl.	D.
10	Avis	A.V. Roe & Co., Ltd.	Hinkler ..	B	608	24	0	30	0	255	565	938	Br. C.	G.
11	Avis	A. V. Roe & Co., Ltd.	Hinkler ..	B	608	24	0	30	0	255	565	938	Bl.	D.
12	Bluebird ..	Blackburn Aeroplane & Motor Co., Ltd.	Loton ..	B	594	21	8	28	0	243	495	875	Bl.	D.
13	—	Frank Ernest Reine.	—	M	608	21	9	38	0	176	—	710	—	—
14	Cygnet I. ..	Hawker Engineering Co., Ltd.	Longton ..	B	601	20	5	28	0	165	373	730	A.	D.
15	Cygnet II. ..	Hawker Engineering Co., Ltd.	Raynham ..	B	601	20	5	28	0	165	373	780	A.B.C.	—
16	Vagabond ..	Vickers Ltd. ..	Payn ..	B	617	21	10	28	0	235	527	887	Br. C.	D.
17	Pixie III. ..	G. Parnall & Co...	Douglas ..	M	604	21	2	32	5	137	—	—	Br. C.	D.
18	Pixie IIIA. ..	G. Parnall & Co...	De Haig ..	B	608	21	2	32	5	238	—	—	A.	—
19	Pixie IIIA. ..	G. Parnall & Co...		B	608	21	2	32	5	238	—	—	?	—

B = Biplane. M. = Monoplane. A. = Anzani. A.B.C. = A.B.C. Bl. = Blackburne. Br. C. = Bristol Cherub. D. = Direct. G. = Geared.

Although a detailed reference to the various machines is made in the following pages it is thought that a few notes elaborating the information contained in the table above may be useful for reference purposes. The two Bristol "Brownies" are identical except that No. 2 is 2 ft. shorter in the span and has 6 sq. ft. of wing area less than No. 1. The Cranwell biplane is a side-by-side two-seater, designed and built by members of the Cranwell Light Aeroplane Club. It is the only "amateur" in the competitions. No. 4, the Beardmore "Wee Bee," is a high-wing monoplane with an exceptionally good performance, the estimated top speed being 86 m.p.h. No. 5, the Westland "Wood Pigeon," is a normal staggered biplane, while No. 6, the Westland "Widgeon," is the only "parasol" monoplane in the competitions. No. 7, the "A.N.E.C. II," is very similar in general appearance to the Beardmore "Wee Bee," although there are several detail differences not readily discovered by a casual inspection. The engine is, however, a British Anzani.

No. 8, the Short "Satellite," is remarkable for its all-Duralumin fuselage, which should make the machine readily recognisable, even when flying. The Supermarine "Sparrow," No. 9, has the rear portion of its fuselage cocked-up so as to get a large angle of incidence when the tail is near the ground. Nos. 10 and 11 are really one machine, although entered as two in order to be able to use two different engines. The Blackburn "Bluebird" is a side-by-side biplane and is readily identified by its wide fuselage. Of No. 13, the Raine monoplane, but few particulars are available, and this is the only machine of which I have not been able to obtain general arrangement drawings.

The Sopwith-Hawker "Cygnet I" and "Cygnet II" (Nos. 14 and 15) are very clean biplanes with small bottom plane. They are alike except for the engines. The Vickers "Vagabond," No 16, is a biplane with very pronounced stagger, and with the bottom of the fuselage rounded as well as the top. No. 17, the Parnall "Pixie III," is a low-wing monoplane with strut bracing. The biplane No. 18, which is known as the "Pixie IIIA," is the monoplane with a top plane added. It is believed that No. 19 has been entered so as to widen the choice of engine, and that actually but two Parnall machines will take part.

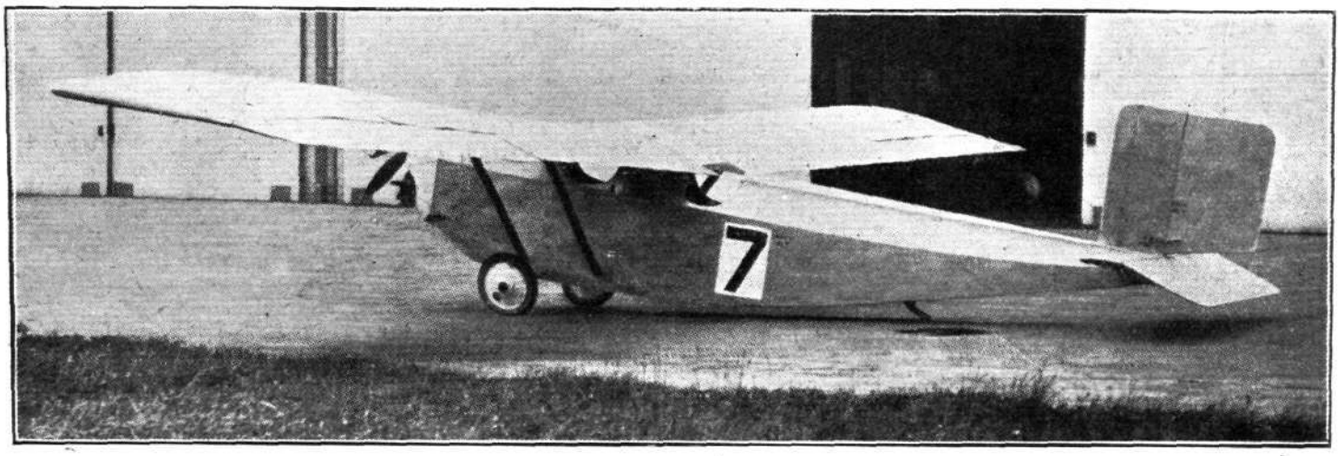
With regard to pilots, where more than one is entered this has been done so that changes may be possible during the week. As space did not permit of giving the pilots' names in full in the table they are given herewith as follows:—Capt, F. S. Barnwell, Capt. H. C. Biard, Flight-Lieut. N. Comper, Mr. T. W. Campbell, Squadron Leader W. S. Douglas, M.C., D.F.C., Mr. S. H. Gaskell, Flight-Lieut. R. A. de H. Haig, Mr. Bert Hinkler, Mr. J. H. James, Squadron Leader W. H. Longton, D.F.C., A.F.C., Mr. A. G. Loton, Flight.-Lieut. E. P. Mackay, R.A.F., Mr. J. L. Parker, Squadron Leader H. J. Payn, A.F.C., Mr. M. W. Piercey, Mr. F. P. Raynham, Mr. C. F. Uwins, and Mr. A. J. Winstanley.

FLIGHT

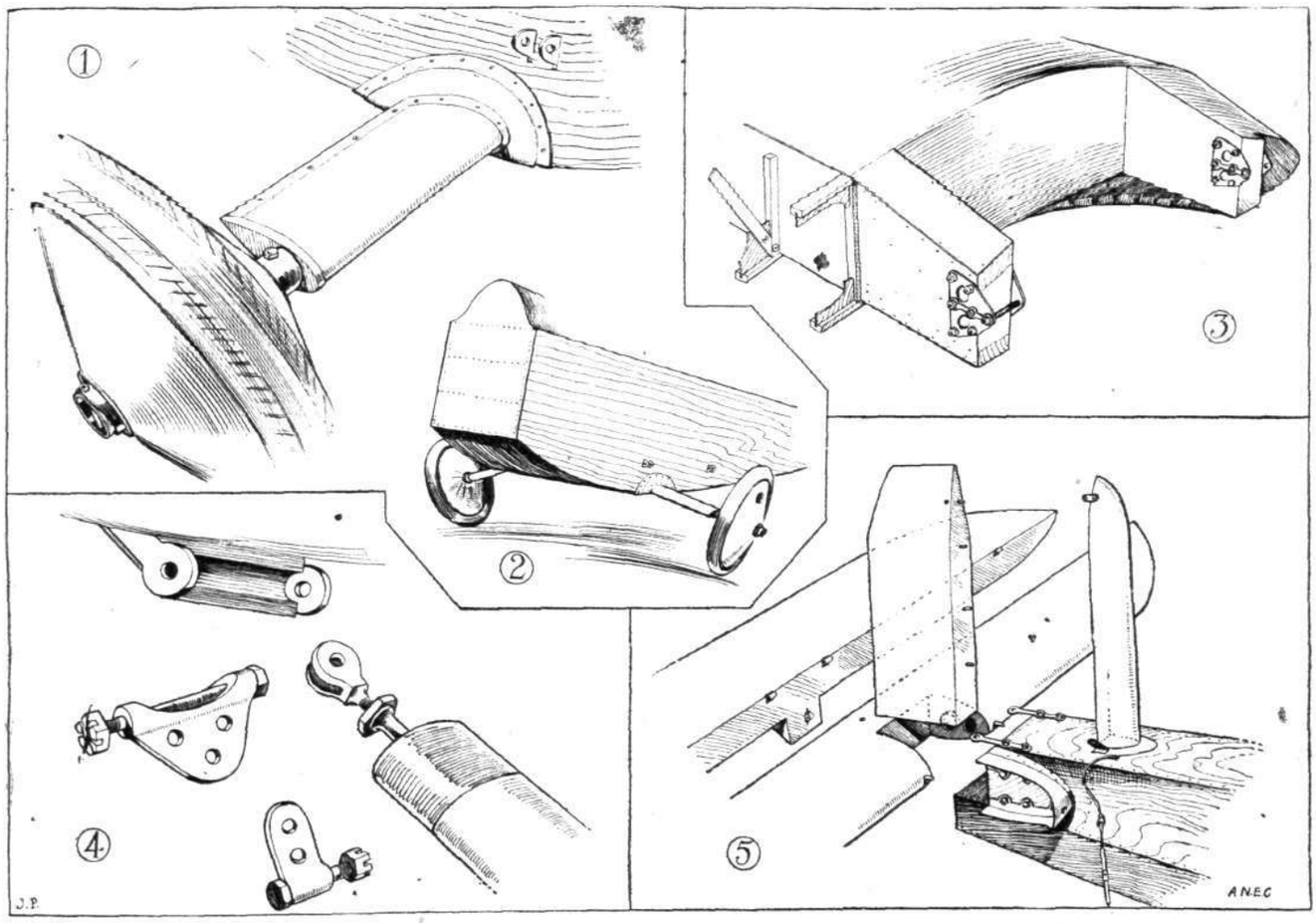
THE "A.N.E.C. II" LIGHT MONOPLANE (No. 7)

1,100 c.c. Anzani Vee-Twin Engine

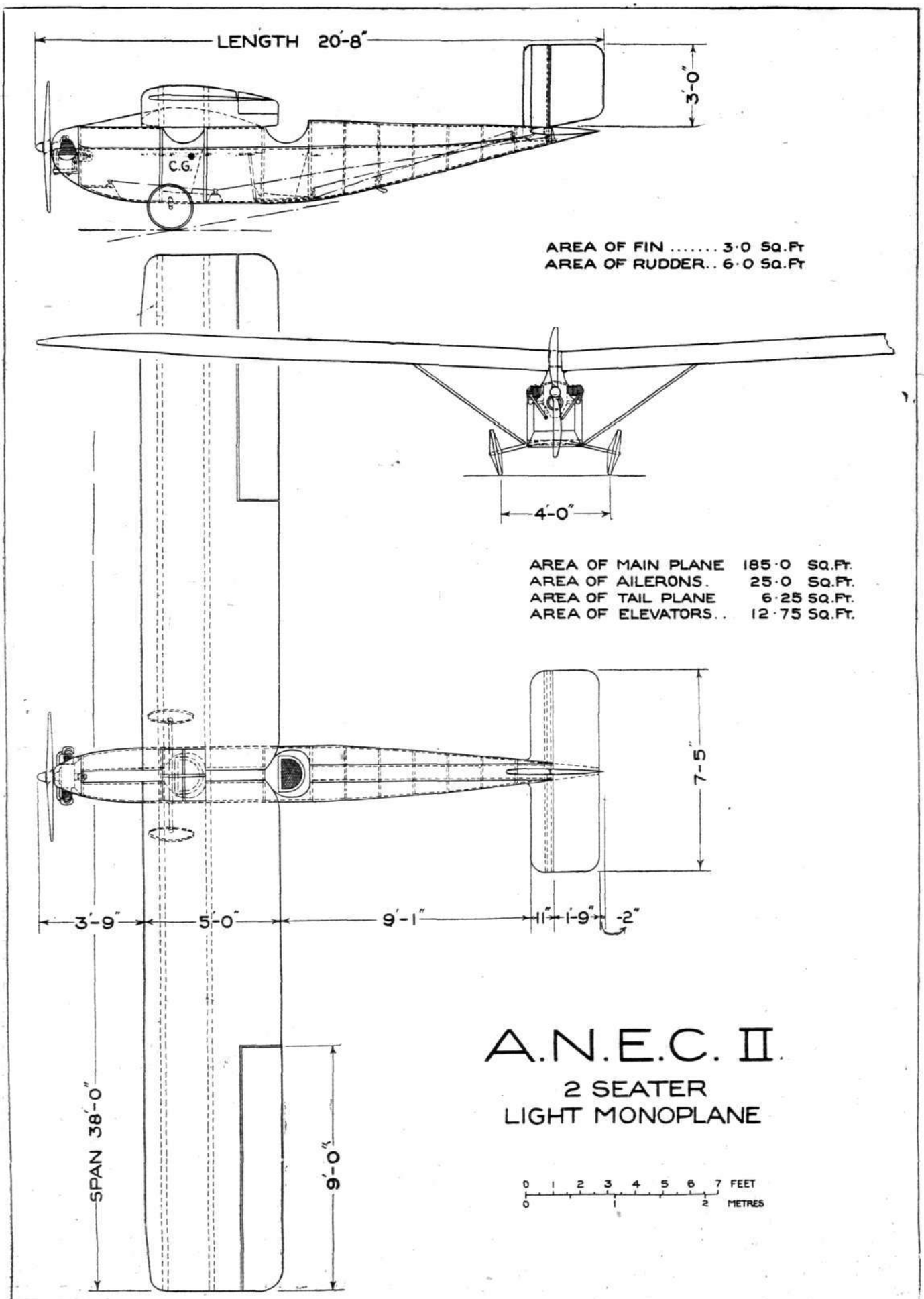
DESIGNED by Mr. W. S. Shackleton and built by the Air Navigation and Engineering Co., Ltd., of Addlestone, Surrey, the "A.N.E.C. II" light monoplane, with 1,100 c.c. Anzani engine, has a strong family resemblance to last year's single-seater A.N.E.C. monoplane which did so well in the Lympne competitions. The same form of fuselage construction has been adopted, and the general shape of the body is also very similar, although certain minor changes have been effected. It was objected that in the single-seater the pilot's view was not all that it might have been, but in the two-seater a serious attempt has been made to improve the view from both seats. This has been achieved partly by making the "deck" of the fuselage narrower, and partly by the different arrangement of the wing attachment. The fuselage structure is flat-



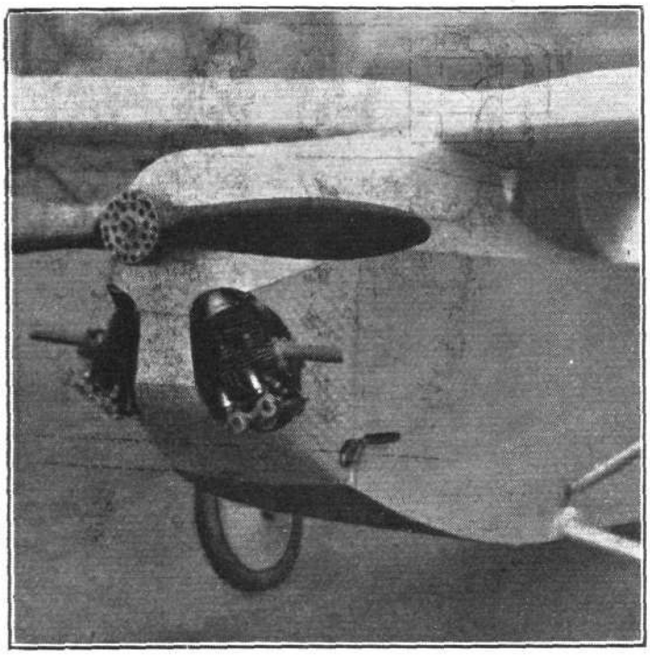
THE "A.N.E.C. II" MONOPLANE: Three-quarter rear view.



SOME CONSTRUCTIONAL DETAILS OF THE A.N.E.C. MONOPLANE: 1, A general view of one side of the very simple undercarriage. The axle is a bent tube, so fixed in the sides of the fuselage that it cannot turn. The only springing is that provided by the flexibility of the axle, and by the pneumatic tyres. The view in Fig. 2 gives an idea of the general arrangement of the chassis. 3 shows the root of the port wing, with cut-out portion for front cockpit. The wing spars are hinged to the top fairing of the fuselage. 4, Details of the lift-strut attachment to the wing spar. The lower end of the strut is secured to the fitting shown in 1. The tail, Fig. 5, is attached to the stern of the fuselage as shown, the fin being in two sections, of which one is integral with the fuselage structure. The elevator carries out the lines of the fuselage, and is hinged at its upper edge, being operated by a push-and-pull rod from the body.



THE A.N.E.C. LIGHT MONOPLANE: General arrangement drawings, to scale. The machine is shown with Bristol "Cherub" engine, but in the competitions it will be fitted with an Anzani.



The Anzani engine in the " A.N.E.C. II " monoplane. Note the inverted position.

sided and the deck has " hollow " sides so as to enable the pilot to look out over the nose on either side. A slender framework of spruce forms the skeleton and the three-ply covering provides the bracing.

The wing structure is different from last year's in that in place of the very original triangular-section single spar employed on the single-seater this year's model has two box spars of orthodox construction, with spruce flanges and three-ply walls. Lattice ribs of spruce and three-ply are used, and the structure is further strengthened against torsion by being covered with three-ply up to the rear spar on the under surface and up to the front spar on top. The fabric is put on at an angle of 45 degrees in order to stiffen the wing against twisting loads. The wing is in two halves, the roots being bolted to strong bulkheads in the fuselage, and is braced by a pair of struts on each side. One of each pair is provided with adjustment for incidence, as shown in a sketch. The ailerons are hinged at their lower edge, and there are no external cranks on top, the return cable passing direct from the upper edge of the aileron.

The tail plane and fin are of somewhat unusual design in that the latter is in two sections with dowels to locate it and take shear loads, while the former is built into the end of the fuselage rather than resting on top of it. One of our sketches shows the arrangement. The one-piece elevator is hinged at its upper edge only, and has on the lower surface a central projection which carries the shape of the fuselage into the surface of the elevator, thus avoiding any sudden breaks in the lines. A further advantage of this form of construction is that the elvator can be operated without any external crank lever, there being a lay shaft near the stern of the fuselage carrying the usual crank arms, from one of which a push-and-pull tube runs to the lower edge of the elevator, the fitting for it being shown in the sketch. Cables run from the cranks on the lay shaft forward to the controls.

The undercarriage is of the simplest possible type, and consists of a single high-tension steel tube, so secured to the lower longerons that it cannot turn in its bearings, and bent downwards at the ends. The only springing is that provided by the tyres and by the flexing of the axle.

The Anzani engine is, as already mentioned, mounted in an inverted position in the nose of the fuselage, the petrol tank being mounted under the deck fairing immediately aft of the fireproof bulkhead. The " A.N.E.C. II " is of very clean outline design, and the workmanship is very good. The machine should do well iu the competitions. Data of areas and weights are given in the table on page 588.

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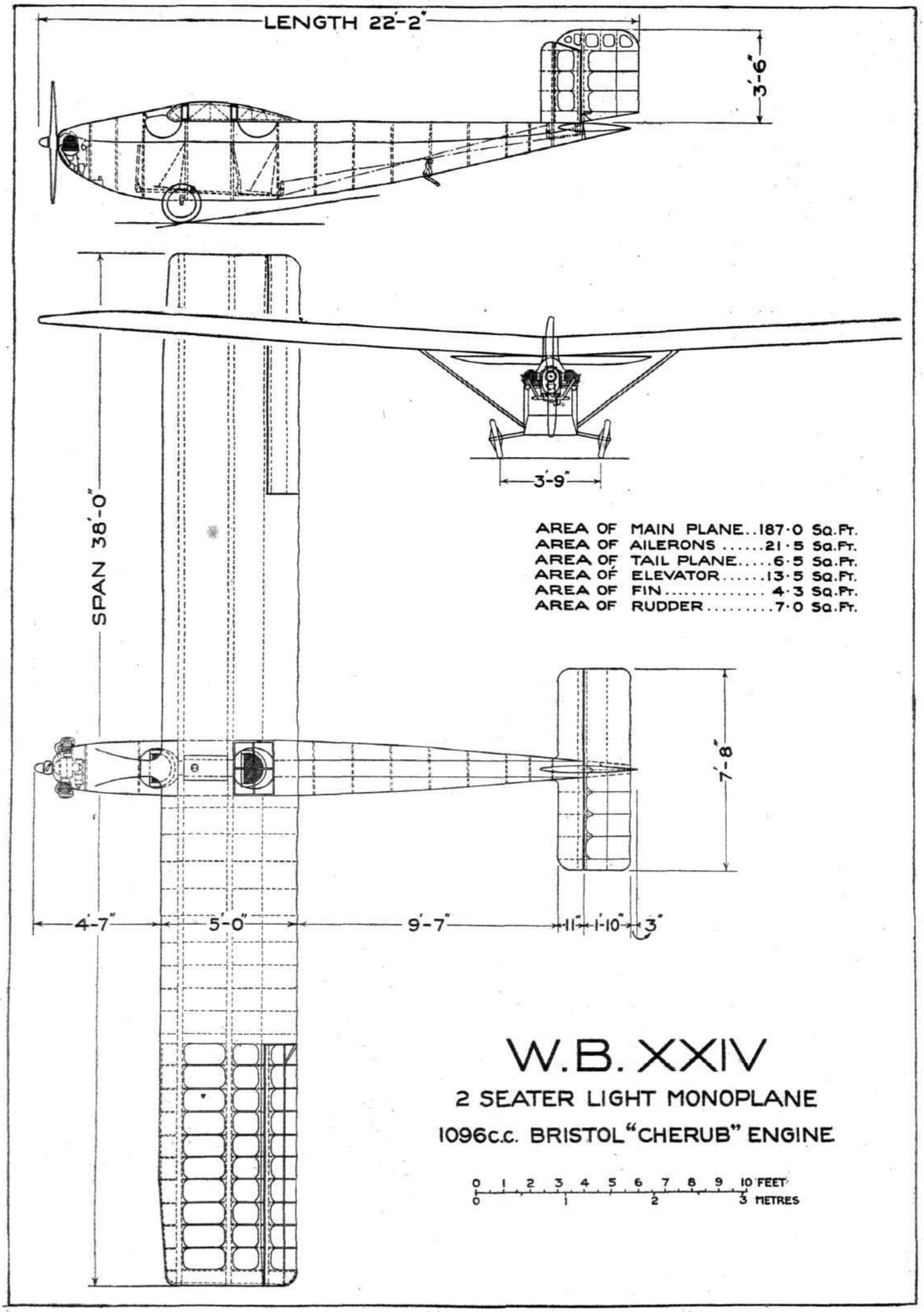
THE BEARDMORE "WEE BEE I" LIGHT MONOPLANE (No. 4)

Bristol "Cherub" Engine

THE first machine to be designed by Mr. W. S. Shackleton, after he joined Wm. Beardmore and Co., Ltd., was the light monoplane shown in the accompanying illustrations. It is, of course, only natural that there should be similarities between the " Wee Bee I," as the Beardmore light monoplane has been christened, and the A.N.E.C. monoplane, for whose design also Mr. Shackleton was responsible. There are, however, several differences between the two machines, quite apart from the difference in engines.

The W.B. XXIV, to give the machine its proper series number, is a thick-wing monoplane of very clean design, every effort having been made to reduce to a minimum any projections which might adversely affect the performance. The machine is not, however, a cantilever monoplane, as its wing is divided in the centre and each plane is braced by two struts from the lower longerons of the fuselage. Apart from this fact, however, there is no external bracing anywhere, either in the tail or in the undercarriage. The cross-section of the fuselage is the smallest possible to reduce head resistance, and altogether the " Wee Bee I " represents a very serious attempt at aerodynamic perfection. That the striving of the designer has not been in vain appears to be indicated by the performance curves given on page 594, to which reference will be made again later, The top speed is

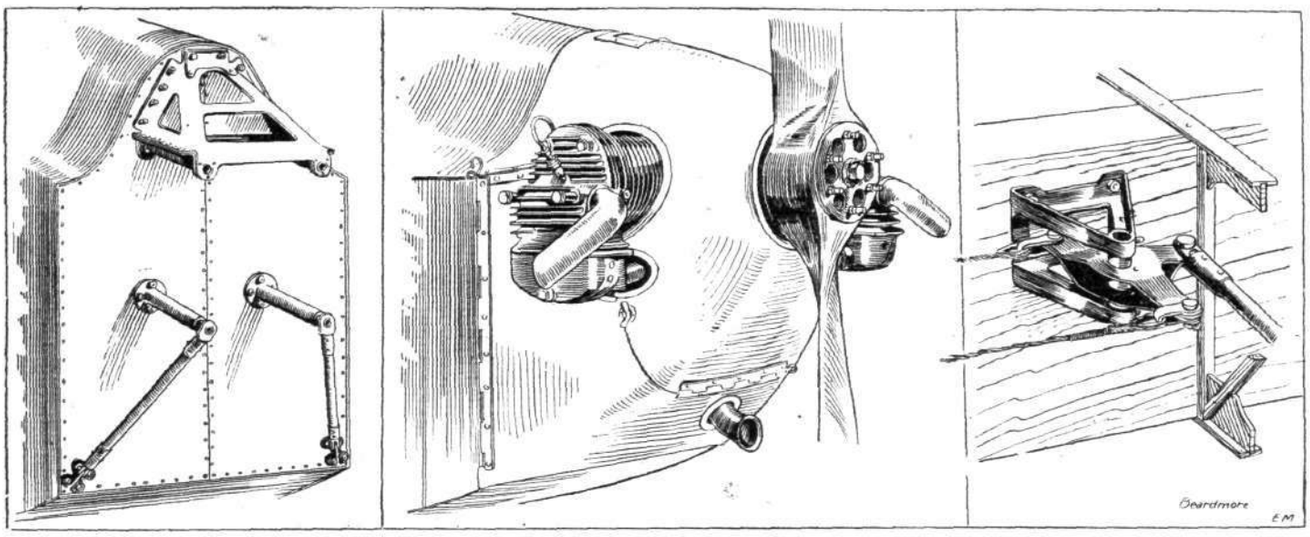
THE BEARDMORE LIGHT MONOPLANE, " WEE BEE I," BRISTOL " CHERUB " ENGINE : Three-quarter front view.



THE BEARDMORE LIGHT MONOPLANE "WEE BEE I," BRISTOL "CHERUB" ENGINE: General arrangements drawings, to scale.

extremely good, and the minimum horse-power required is so low that the machine probably has a greater reserve of power than any other in the competitions.

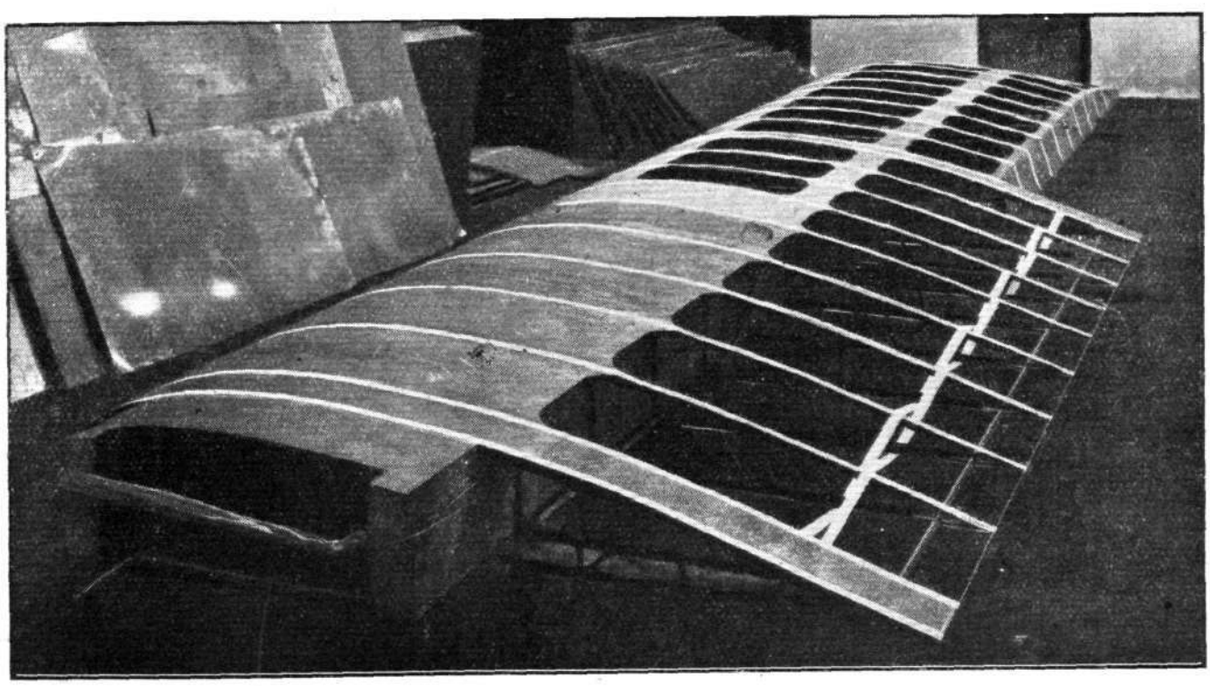
The fuselage is built on six spruce longerons with formers or bulkheads of spruce and three-ply, the whole being covered with $\frac{1}{16}$-inch birch three-ply. The deck fairing, instead of being arched, as is usually done, is "hollow-ground," and thus conforms roughly to the shape of a man's head and shoulders. Thus, the pilots are stream-lined, while, by moving their heads slightly to right or left, they can look past the fairing. The photographs and general arrangement drawings show this deck fairing admirably. The two cockpits are arranged one aft of the wing, or rather aft of the rear spar, and one ahead of the front spar. There is a square opening in the trailing edge through which the pilot enters, and which is covered during flight by a celluloid window. The front cockpit is entered by swinging upwards a small hinged portion of the leading edge of the wing. When the pilot is in place, the leading edge is brought down in line with the rest of the wing and locked in position. The view from both cockpits is very good, particularly so from the front one, where there is practically no obstruction if the pilot leans his head slightly to left or right. For landing, particularly, this position seems to be almost ideal.



BEARDMORE CONSTRUCTIONAL DETAILS: On the left a sketch, showing the very neat engine mounting. Centre: The Bristol "Cherub" in place and cowled in. On the right an aileron crank with push-and-pull rod.

The controls and instruments are of usual type, and the machine is, of course, capable of being flown from either seat. When being flown solo, with the pilot in the front seat, a small weight in the rear cockpit is probably necessary for trimming purposes. In the case of the pilot-owner this weight would, presumably, be made up of the owner's luggage, in which case the machine would not be carrying any unnecessary load.

The monoplane wing is of fairly orthodox construction in that it has the usual two main spars, of box section with

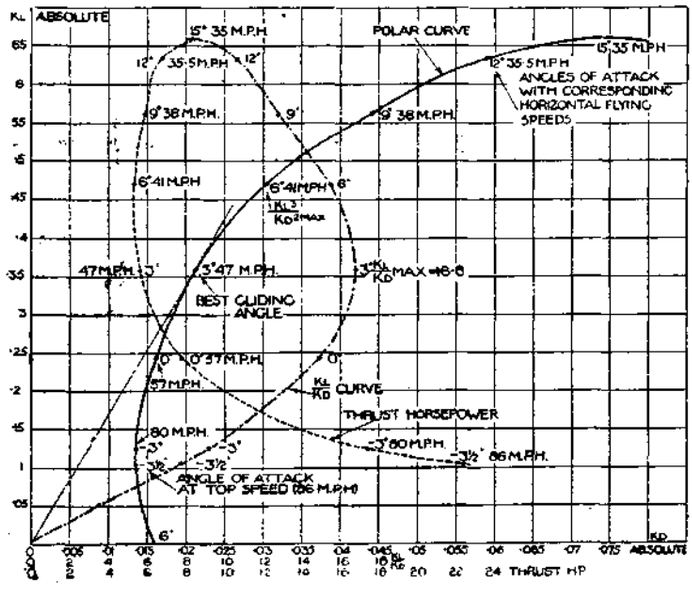


This photograph gives a good idea of the wing construction of the Beardmore "Wee Bee."

three-ply walls. Both flanges and walls taper in thickness towards the tips, being proportioned to the shear and bending moments along the span. There is no internal drag bracing in the wing, at least in the ordinary sense of the term. This function is performed by the three-ply covering which extends along the entire leading edge, up to the front spar, and near the root, as far out as the strut attachments: in fact, this three-ply covering extends back to behind the rear spar.

The ailerons are of large aspect ratio, and are hinged to a false rear spar or stringer. They are operated by crank levers through short push-and-pull rods, and no control pulleys are employed.

The tail unit is also of interest, and shows to some extent the same characteristics as those illustrated in the case of the



Estimated performance curves of the Beardmore two-seater light monoplane with Bristol "Cherub" engine.

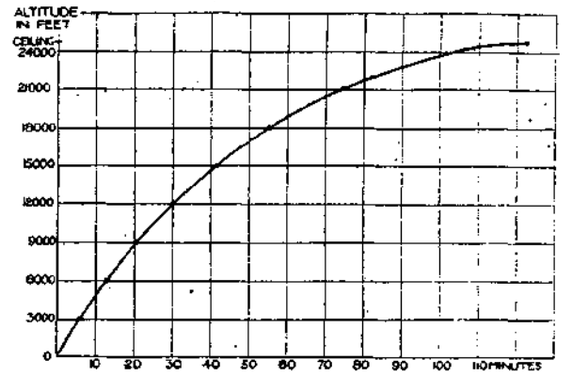
"A.N.E.C. II." The fin is in two sections, located by dowel pegs, and the tail plane has but a single spar, built integral with the rear portion of the fin. The front portion of the fin is integral with the fuselage structure. The elevator is hinged along the top edge, and the opening underneath is covered with a Duralumin flap so that there is no gap at the hinge line.

As in the case of the ailerons, the elevator is operated by a short push-and-pull rod, from cranks on a lay shaft.

The undercarriage consists simply of a single bent tube passing through the fuselage and anchored by suitable fittings at the sides. The axle is of chrome nickel steel, and specially designed to allow of sufficient flexibility to absorb landing shocks. It is supported in the fittings on trunnions, which allow it to flex freely. One trunnion is rigidly fixed to the axle so as to resist torque loads and in order to locate the axle endwise. The trunnion on the opposite side takes up-loads only, and is free to slide on the axle.

The mounting of the Bristol "Cherub" engine is rather ingenious, and should prove very satisfactory in practice. The weight of the engine is taken by a pyramid support of sheet Duralumin, while the vertical position is maintained by two lower struts, also of Duralumin. The lower supports are steadied by diagonal tubes (steel) running to the lower corners of the engine bulkhead. The engine is readily accessible, and can be removed from the machine by undoing four bolts, and, of course, the usual petrol and oil connections, etc. A cowling surrounds the engine, all but the cylinder heads. The entry for the air is, it will be seen, particularly clean and unobstructed and carries out the designer's idea of saving in head resistance.

With reference to performance, although this will be definitely proved or disproved during the competitions, it may be of interest to give the estimated performance figures,



Time-to-Altitude curve (estimated) of the Beardmore light 'plane two-seater.

and we consequently publish a set of curves from which the estimated performance can be seen. The first thing that strikes one is the extraordinarily low horse-power required, and the fact that this does not necessarily diminish with the flying speed. Thus, the minimum thrust horse-power of about 5½ b.h.p. occurs at an angle of 6 degrees, corresponding to a speed of 41 m.p.h. It is of interest to note that the smallest horse-power figure coincides with the angle (6 degrees), at which kL^3/kD^2 is a maximum. This angle also gives the lowest rate of descent in gliding, as those of our readers will remember who studied FLIGHT during the interesting summer of 1922. The angle of attack and corresponding speed giving highest mileage per gallon also gives the best gliding angle. It is at this angle (3 degrees) that the machine flies horizontally with the lowest propeller thrust, and at which the speed horse-power ratio attains a maximum value. It will be observed that the maximum value of L/D occurs at an angle of 3 degrees, and is as high as 16·8. This is, of course, an extraordinarily good figure, and if there is any doubt as to whether all the L/D values estimated are too high, we might point out that on a test flight the machine reached a top speed of 88 m.p.h. as registered by the speed indicator. There is, of course, still the possibility that the indicator was somewhat in error, but at any rate there does seem to be every reason to expect that the estimated top speed of 86 m.p.h. will be attained. A time-to-altitude chart gives the climb of the "Wee Bee I," and this seems to be in keeping with the other performance figures. Altogether the machine should prove a formidable opponent, and its performance in the competitions will be watched with more than ordinary interest.

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THE BLACKBURN "BLUEBIRD" LIGHT BIPLANE (No. 12)

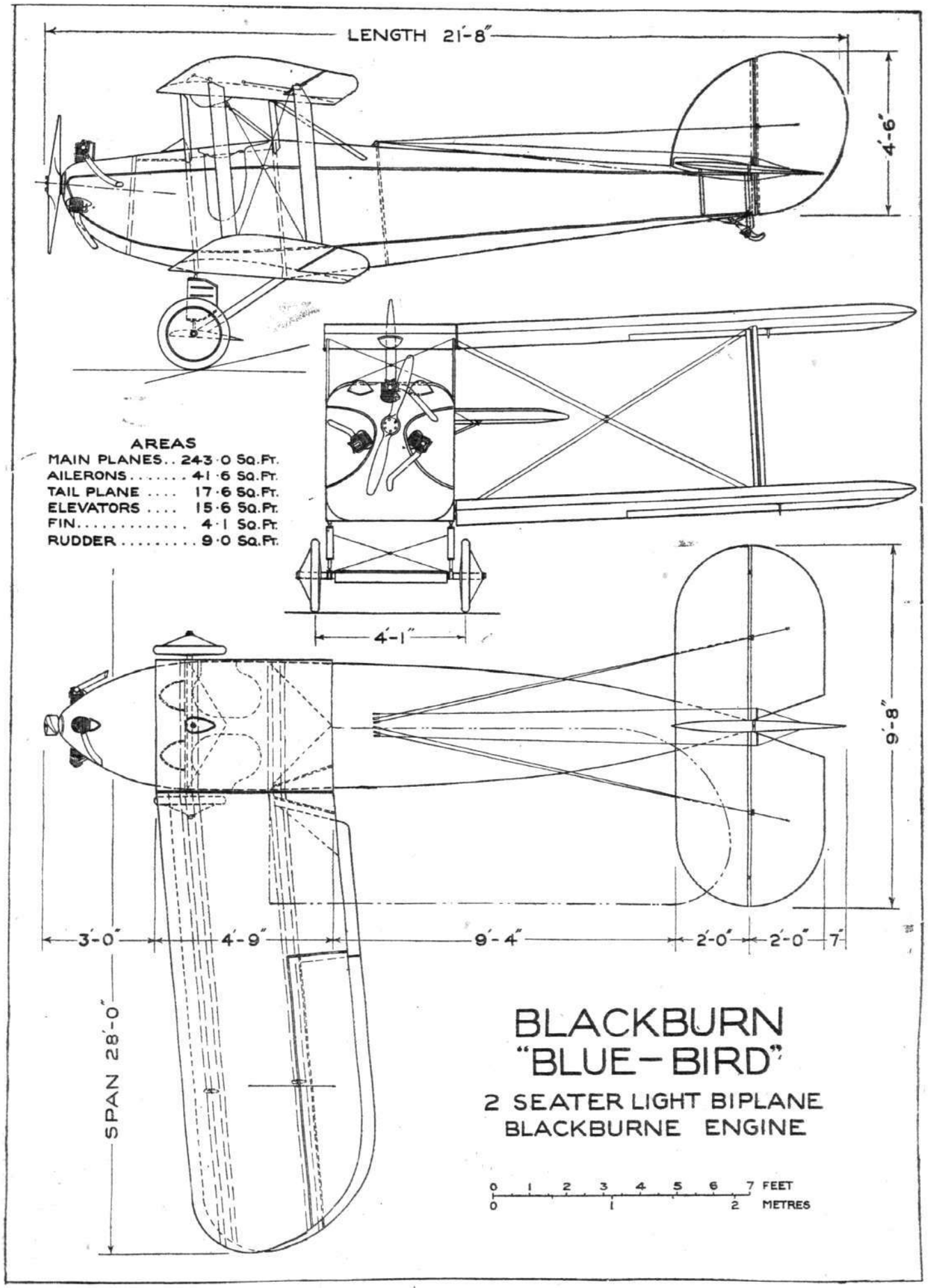
1,100 c.c. Blackburne Radial Engine

IN producing light 'plane two-seaters at the present time two courses are open to designers. One is to design for the Lympne competitions, *i.e.* solely with the object of gaining marks according to the formula used as a basis for judging, and the other is to attempt to anticipate the form which the cheap school machine of the future will take. Although there is no reason to believe that it will not do quite well in the competitions, the "Bluebird" biplane of the Blackburn Aeroplane and Motor Co., Ltd., of Leeds, belongs rather to the second class, inasmuch as its designers have not gone out of their way to produce a "mark collector," but have rather aimed at developing a type in which such features as are deemed desirable in a school machine are incorporated.

One result of this is that the "Bluebird" is a side-by-side tractor biplane, it being presumably assumed that this type is more convenient for school work, while certainly as a private "run-about" the side-by-side arrangement would tend to be more sociable and conversation somewhat easier than in the tandem type. The side-by-side position necessarily means a relatively wide fuselage, with consequent increase in cross-sectional area and possibly slightly higher resistance. We say possibly because it has not by any means been definitely proved that a "fat" fuselage of good streamline shape is worse, from the resistance point of view, than one of small cross-sectional area, but having various excrescences that spoil its lines.

In the case of the Blackburn "Bluebird," the fuselage is built in two separate sections, the front portion being ply-wood

FLIGHT
AIRCRAFT ENGINEER AND AIRSHIPS



THE BLACKBURN "BLUEBIRD" LIGHT BIPLANE: General arrangement drawings, to scale. The engine is a three-cylinder Blackburne.

covered and having its corners rounded off, while the rear portion is the usual longerons and struts type with wire bracing.

The cockpit, as already stated, has accommodation for two occupants sitting side by side, and a door on each side gives ready access to the "office." As prescribed for the competitions, dual controls are fitted, the rudder-operating foot-bar having a parallel movement, while the elevator and ailerons are worked by a single control column centrally placed. This column can be readily adapted to either "branch" control or to plain knob. The deck fairing runs through between the two halves of the cockpit, and there is a small separate windscreen ahead of each coaming.

The main planes of the "Bluebird" are of orthodox construction, with spruce spars and ribs, the latter being of the Warren girder type and very light (5 ozs. each). The drag struts inside the wings are in the form of Duralumin tubes, and the drag bracing is 4 B.A. tie rods. The inter-plane struts are also in the form of Duralumin tubes, fitting into Duralumin sockets and taper pins.

As will be seen, from the general arrangement drawings, the wings are set at a fairly pronounced dihedral angle, and, what is more unusual, they are slightly swept back so as to give the correct trim for the particular placing of the pilots. Incidentally, it may be pointed out that with the side-by-side seating arrangement no change in trim takes place when the machine is being flown solo, and thus it is never necessary to carry any ballast. The wings are made to fold back, hinged ribs being fitted in the trailing edge adjacent to the hinges.

The undercarriage is of simple V-type, and the fact that the fuselage is of considerable width has allowed of keeping the chassis V's vertical, as seen from in front. The shock-absorbing gear is in the form of telescopic tubes, with rubber blocks working in compression, and recoil dampers are incorporated.

All control surfaces are of large area, and it is expected that the machine will be very manœuvrable, even when close to the stalling angle, a very necessary precaution in view of the low-speed tests which have to be flown close to the ground.

The three-cylinder Blackburne radial engine is mounted on triangulating tubes meeting on dead centres, and there is a fireproof bulkhead between the engine and the cockpit. The petrol tank is mounted in the top plane centre section, and for the purpose of the competitions is fairly small and takes the contour of the wing section. For use later on, should a larger petrol capacity be required, a larger tank can easily be fitted. It might be mentioned that the machine has been "stressed" for a more powerful engine, and should, as seems likely, a 1,500 c.c. engine be required later, the only change necessary is the subsitution of larger cylinders and pistons, the Blackburne crank-case and crankshaft having been designed for the larger capacity.

THE BRISTOL "BROWNIE" MONOPLANES (NOS. 1 AND 2)

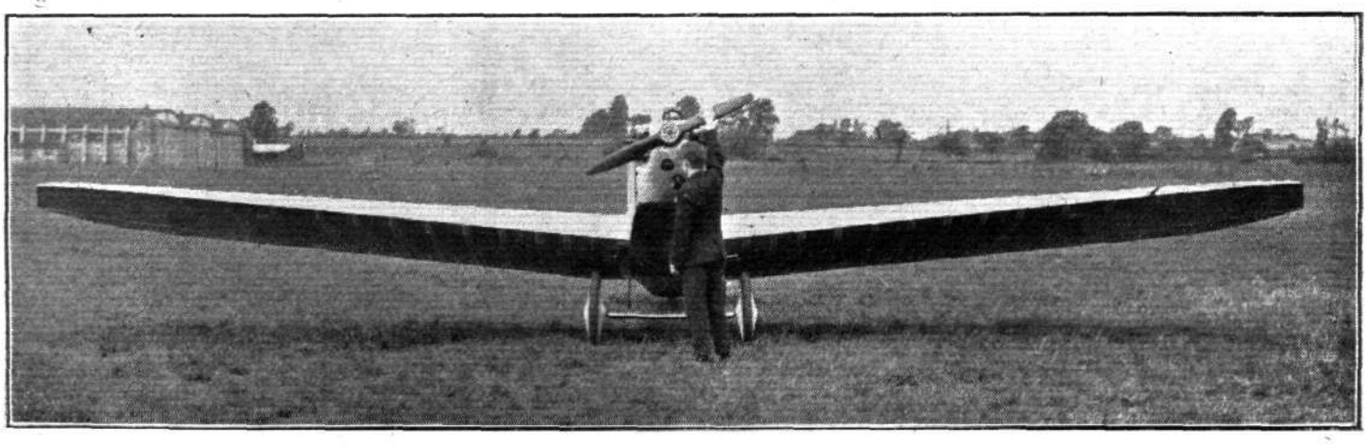
Bristol "Cherub" Engines

OF exceptional interest are the two monoplanes entered for the Lympne competitions by the Bristol Aeroplane Co., Ltd., of Filton, Bristol. Not only do they represent the first designs by Captain F. S. Barnwell since his return from Australia, but they, or rather one of them, represent the only example in the competitions of all-metal construction. The Short monoplane has an all-Duralumin fuselage, but the wing is of the usual composite wood and metal construction. The same applies to the other Bristol monoplane, which has a steel tube fuselage but a wooden wing. In the following notes any reference to the fuselage applies equally to both Bristol "Brownies," but the sketches showing wing details, and the notes dealing therewith, refer specifically to the all-metal wing. That no detailed reference is made to the wooden wing is not due to any lack of interest, for, as a matter of fact, even the wood wing incorporates many features that might have been illustrated and described, but in an issue like the present we are naturally somewhat limited as regards space, and we have, therefore, thought it well to devote such space as is available to a fairly detailed reference to the all-steel wing as being the more interesting of the two, especially as this is the first time one has had an opportunity of illustrating in detail the Bristol methods of steel construction, upon which, although it has not been generally known, the Bristol Company has been doing a great deal of experimental and research work.

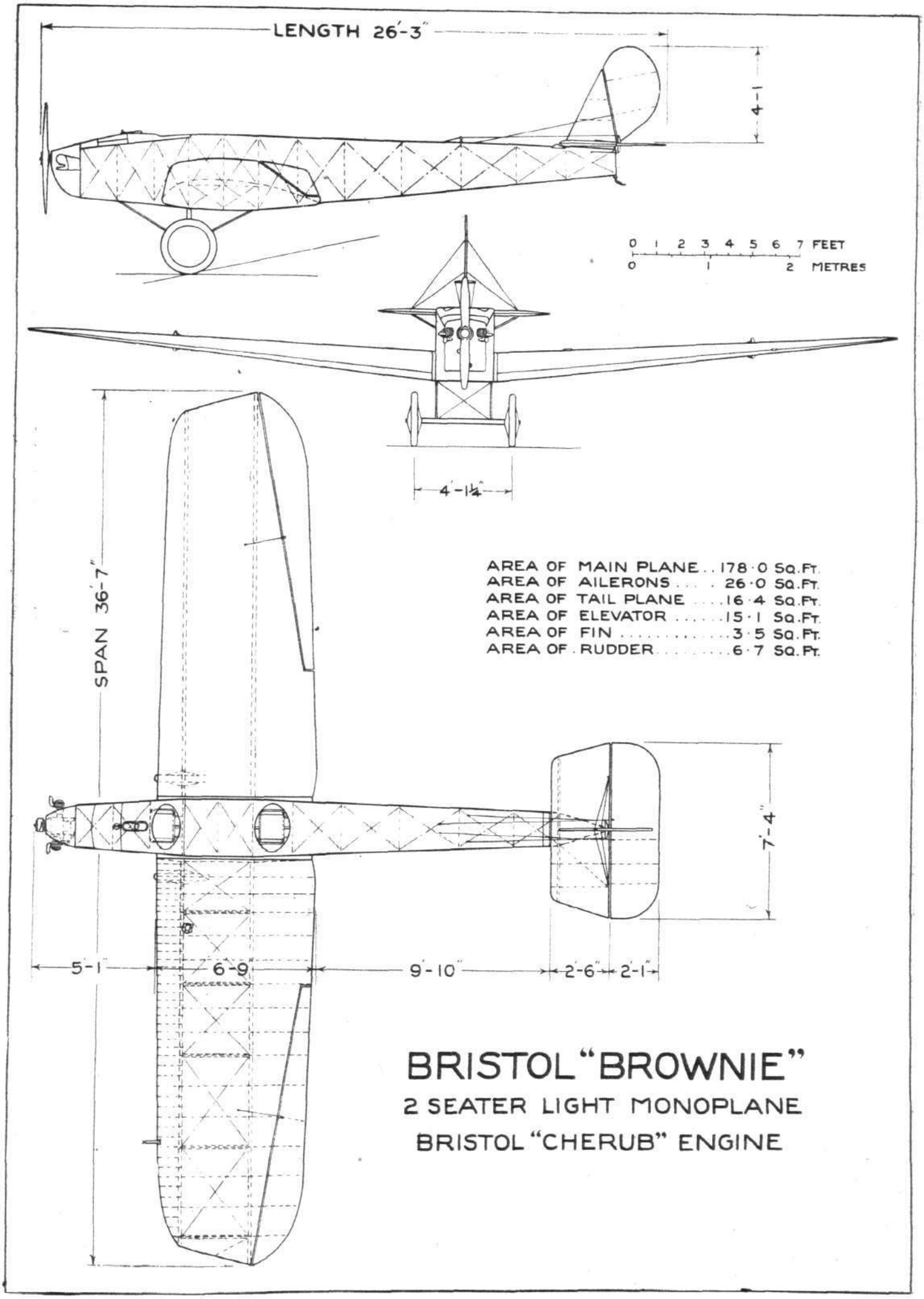
As regards aerodynamic design, the Bristol "Brownies" are low-wing, cantilever monoplanes with bi-convex aerofoils tapering in chord and depth from root to tip. The section, although of great maximum depth, is not a high-lift section, but is rather on the lines of some American aerofoils which were described in FLIGHT last year. As a matter of fact, the particular section employed is not identical with any of the American sections, but is one developed by Captain Barnwell. Wind tunnel tests have been carried out in the Bristol wind tunnel, so that very complete data should be known to the designer, the more so as the first machine was finished and flying some six weeks ago, so that there has been ample opportunity to discover whether or not the actual light 'plane tallies with the wind tunnel model.

The fuselage is of fairly large maximum cross-sectional area, and is of the flat-sided, flat-topped variety. The machine is of fairly high aspect ratio, and the body is of rather more than usual length, so that one would expect the machine to be pleasant to fly. The flying tests have, we believe, proved this to be the case, and the "Brownies" are said to handle particularly well. Large tapering ailerons are fitted, which should give ample lateral control. With reference to the latter a somewhat novel arrangement has been adopted. Instead of the usual "positive" cables, the ailerons on the "Brownies" are pulled down by rubber cords suitably tensioned, and the "return" cable is connected to the controls and positively operated. The object of this arrangement is to impart to the wing to some extent the principle of automatically variable camber, since, as the speed increases and the pressure on the ailerons with it, the flaps will automatically rise.

With reference to structural design, steel is, as already mentioned, the material used, exclusively in one machine and in the fuselage of the other. The fuselage is a girder of steel tube longerons and struts, braced by piano wire and turnbuckles. Fig. 8 in our set of sketches shows a typical fuselage joint, from which it will be seen that a short length of sleeving is slipped over the longeron at the strut attachments, the



THE BRISTOL "BROWNIE," BRISTOL "CHERUB" ENGINE: Front view.



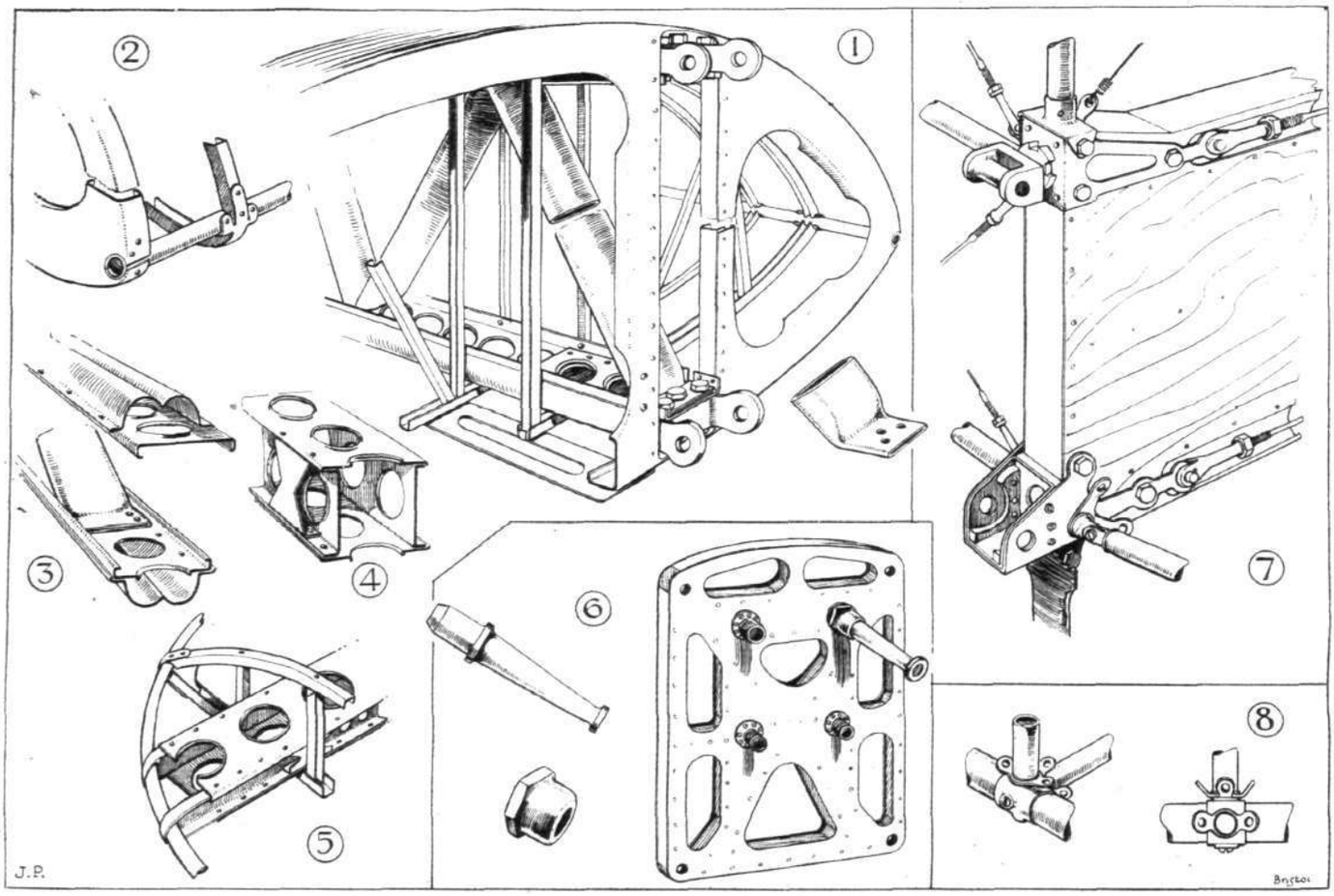
THE BRISTOL "BROWNIE" LIGHT MONOPLANE :- General arrangement drawings, to scale.

THE BRISTOL "BROWNIE" LIGHT MONOPLANE, BRISTOL "CHERUB" ENGINE: Three-quarter rear view.

bolts for the latter being slightly staggered so as to clear each other. Exceptions from this form of construction occur where local considerations demand. Thus, at the point of attachment of the wing halves wood bulkheads are incorporated, as shown in Fig. 7. These are frames covered both sides with three-ply so as to form boxes. The undercarriage strut attachments, also, are located on these wooden bulkheads, as indicated in the sketch.

The cockpits are arranged tandem fashion, and with the low position of the wing the view is exceptionally good, except straight down from the rear cockpit, where the large chord at the root of the wing obscures it to some extent, although this is probably of small importance as the pilot can look forward over the leading edge for landing. The controls are of usual type except for the aileron controls already referred to.

The undercarriage is of somewhat unorthodox design, the



SOME BRISTOL "BROWNIE" CONSTRUCTIONAL DETAILS: Some of our sketches show features common to all three Bristol machines, but those relating to the wing structure show the all-metal construction. 1, the root of the port wing. Note the very original spar web, consisting of a circular steel tube bent zig-zag fashion and flattened out at the points of attachment to the spar flanges. 2, details of the attachment of the leading edge. 3, 4 and 5, details of the spar construction. Towards the wing tip, where the spar depth becomes smaller, the zig-zag web is not continued, and the construction is of the form shown. 6 illustrates the mounting of the "Cherub" engine on four tubular cantilever pillars without bracing. These pillars are permanently bolted to the engine, and are attached to the engine bulkhead by unions. 7 shows the attachment of the wing to the fuselage. A wood bulkhead is built-in at this point, although the fuselage is of steel tube construction, and the upper spar flange attachment has provision for setting dihedral and incidence by the micrometer adjustment shown. 8 shows a typical fuselage joint.

"legs" consisting of two vertical streamline tubes secured to the front spar boxes and braced fore and aft by wires. The high-tensile steel axle extends a considerable distance beyond the strut supports and absorbs some of the shock by its deflection. No rubber shock absorbers are fitted. The wheel track is just over 4 ft. Lateral bracing between struts is in duplicate.

Perhaps the most interesting feature in the design, from a structural point of view, is the all-metal wing, and this is consequently shown by several sketches. The steel spars are of very original design, especially as regards the webs, which are formed of zig-zag steel tubing. This tubing, normally of circular section and some $1\frac{3}{4}$ ins. in diameter, runs through from root to a few feet from the wing tips. This tube is flattened out and bent over as it meets upper and lower flange respectively, to which it is attached by small, flat plates and rivets. The tube does not extend right out to the wing tip, as the spar here becomes so shallow that the zig-zag tube arrangement would scarcely be suitable. The outer portion is built up as shown in Figs. 4 and 5. The spar flanges are double, with a flat inner flange, to which the corrugated outer flange is riveted. This point also is illustrated in our sketches. The wing ribs are N-trusses of channel section. Fabric covering is employed for wings as well as fuselage.

The tail plane, elevator, rudder and fin are also of metal construction, but of more orthodox form. The elevator is operated *via* a layshaft, the cranks of which can be seen above the fuselage deck. The tubular fin post is braced by struts below and by two wires above. The fin post, it will be observed, slopes forward. Presumably this has been done in order to bring the pull on the rudder cables at right angles to the post, thus avoiding any side load on the rudder cranks.

The Bristol "Cherub" engine is mounted in a somewhat unusual manner. The fuselage terminates in a ply-wood bulkhead bolted to the tubular longerons. To this bulkhead are secured, by ordinary pipe unions, four pillars which carry the engine. These pillars are cantilever beams, and there is no diagonal bracing of any sort, the pillars taking the direct load as well as the torque. Details of this mounting are shown in Fig. 6, but it might be pointed out that the pillars are normally secured to, and form part of, the engine crank-case, the joint being made by the pipe unions on the engine bulkhead. The engine is thus very accessible, and is easily removed by undoing the four unions and the petrol and oil leads. The petrol and oil tanks are housed above and behind the engine bulkhead, and gravity feed is employed. The main dimensions are shown on the scale drawings, and the figures of weight, etc., are given in the table on p. 588.

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THE "CRANWELL II" LIGHT BIPLANE (No. 3)

Bristol "Cherub" Engine

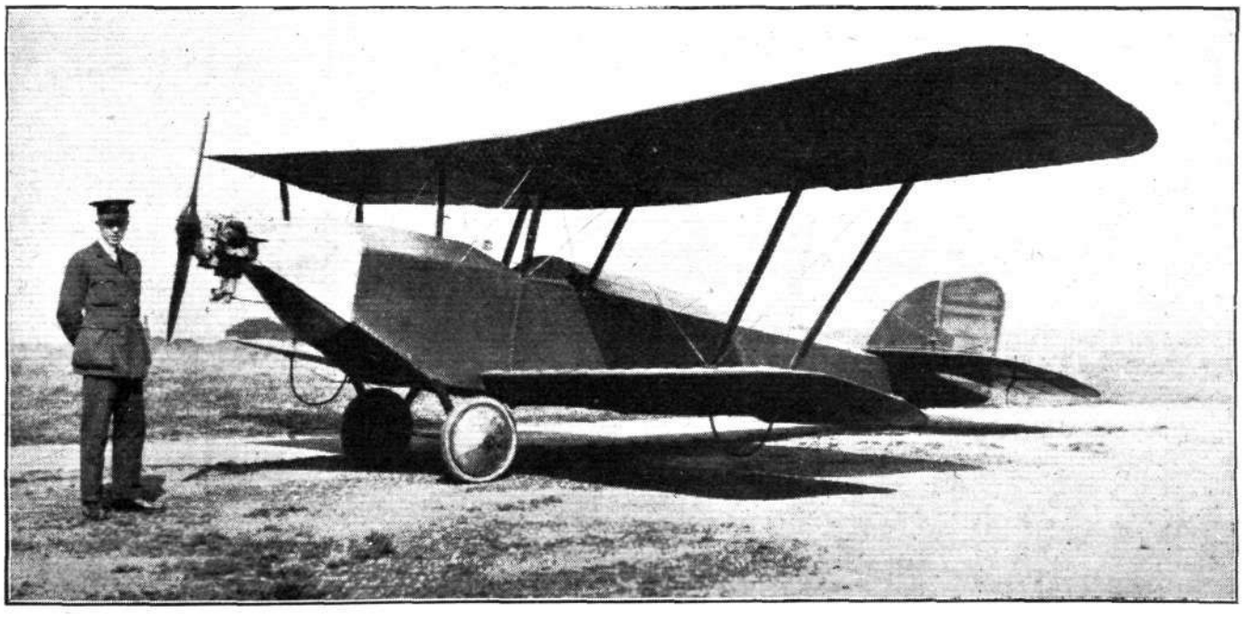
DESIGNED by Flight-Lieut. Comper, A.F.R.Ae.S., and built by the members of the Cranwell Light Aeroplane Club entirely in their spare time, the "Cranwell II," which will carry the number 3 in the competitions, is a very stout effort on the part of a number of enthusiastic amateurs to produce a machine suitable for school work at low cost. It may be mentioned that the machine was designed and the construction commenced more than a year ago, long before the present competitions were decided upon. Consequently the machine has not been planned as an ultra-efficient type for competition work, but rather as a robust and cheaply-made 'bus for strenuous school work in inexperienced hands. That the minimum top speed of 60 m.p.h. stipulated has still been reached is a matter for congratulation, and, unless the whole week at Lympne should prove very windy, there is reason to believe that the "Cranwell II" will manage to cover the course in the high-speed tests at a little more than this minimum. If the wind should be strong it may possibly be difficult to exceed the 60 m.p.h. over the triangular course.

The general design of the "Cranwell II" can be gathered from the general arrangement drawings. It will be seen that the machine is a straightforward biplane, and the only unusual feature is the side-by-side placing of the two occupants. This has been chosen as being more suitable for school work, although the extra size of fuselage may be expected to have a somewhat detrimental effect on the performance.

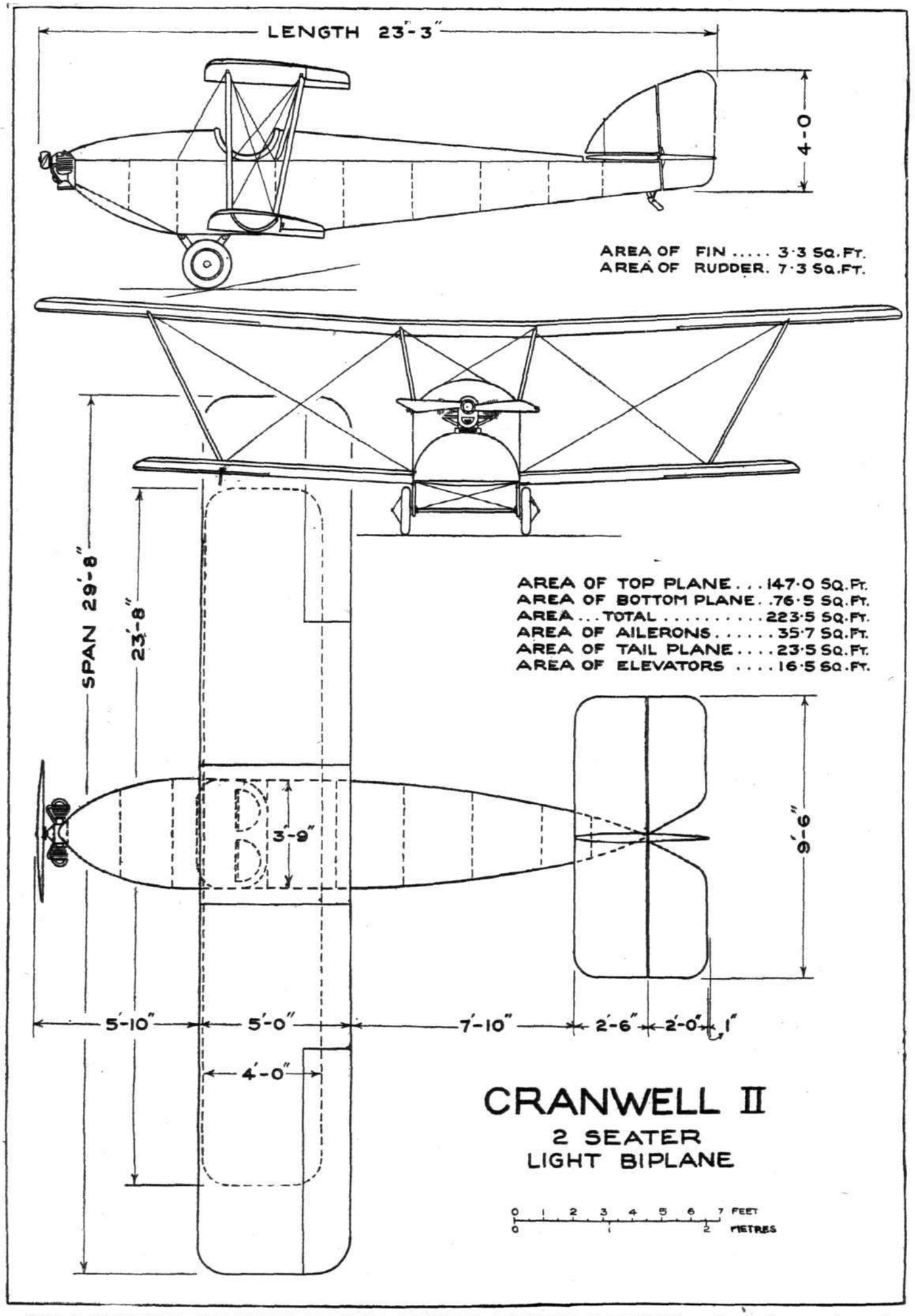
The fuselage is the usual wood girder structure, with wire bracing, flat-sided and flat-bottomed, but with a cambered deck of thin stringers on built-up formers. The cockpit is fairly roomy, the width being mainly decided by the length of foot bars necessary. The two foot bars, side by side, have a connecting cable going over a pulley and kept taut by a spring. Two control sticks are provided, connected together by a transverse bar above the forked ends. The undercarriage is of the V-type, with legs cut from multi-ply wood, as shown in our sketches, each V being a complete unit. Rubber cord shock-absorbers of usual type are fitted.

The biplane wings are of normal type, with I-section spruce spars. No provision has been made for folding the wings, which will be simply dismantled and hung on to the fuselage for the transport test.

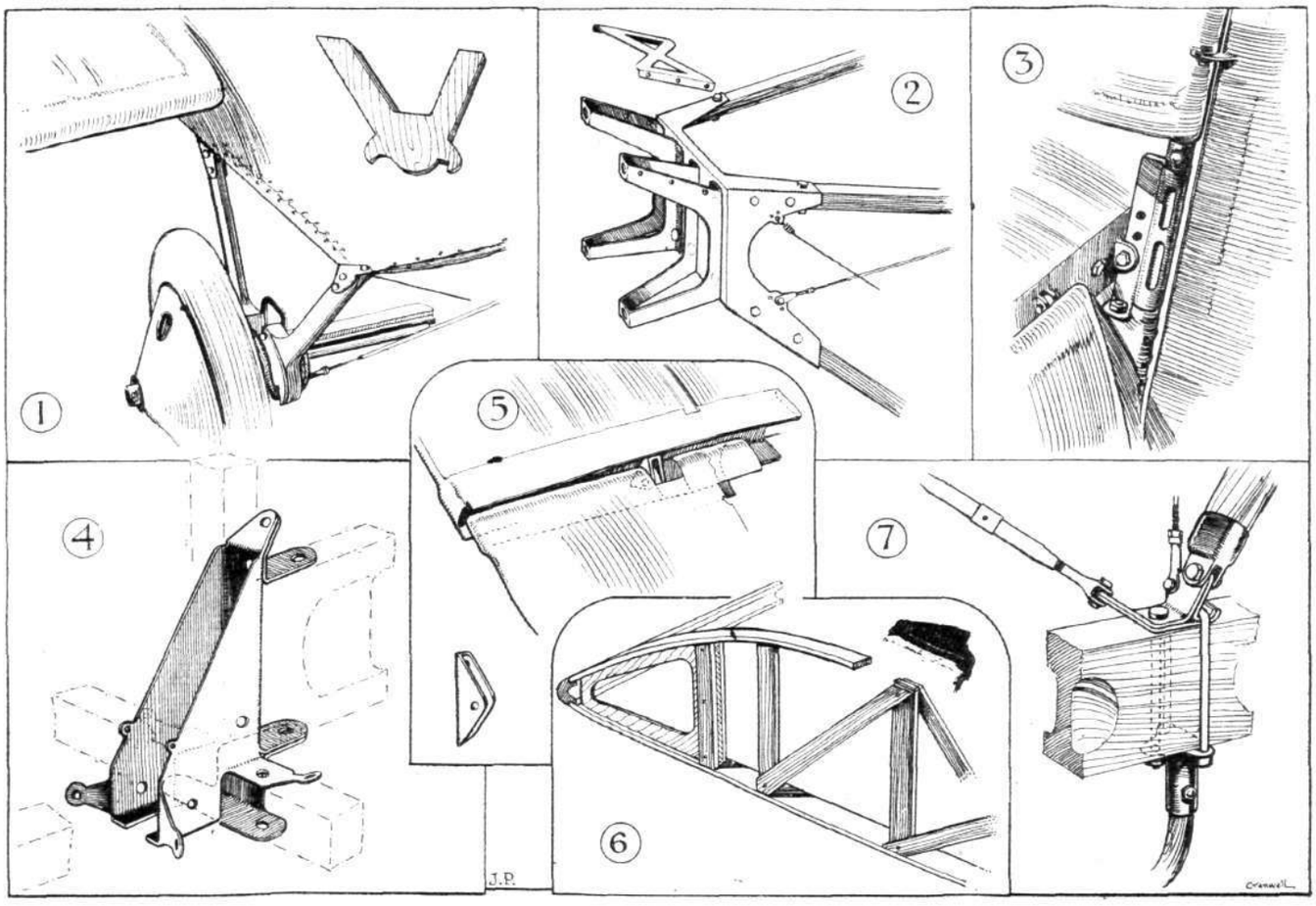
The Bristol "Cherub" engine is mounted on a very small engine bulkhead, the four longerons converging rather sharply towards the nose, and the front portion of the fuselage is butt-jointed to the rest so that, should a more powerful engine be fitted later on, a slightly stronger front portion can easily be built to replace the present one. The petrol



THE "CRANWELL II" LIGHT BIPLANE AND ITS DESIGNER, FLIGHT-LIEUT. COMPER: The machine is a side-by-side biplane, and is fitted with a Bristol "Cherub" engine.



THE "CRANWELL II" LIGHT BIPLANE, BRISTOL "CHERUB" ENGINE: General arrangement drawings, to scale.



SOME "CRANWELL" CONSTRUCTIONAL DETAILS: 1. The undercarriage and details thereof. 2. The mounting for the Bristol "Cherub" engine. 3. The tail plane adjustment fitting. 4. Lower spar attachment. 5. An aileron hinge. The leading edge of the aileron is covered with an aluminium strip to reduce the gap. 6. Details of rib construction. 7. Attachment of wing strut, bracing wire, and wing tip skid.

tank is mounted on the top plane centre-section, so that there is ample "head" for direct gravity feed.

It may be mentioned that the "Cranwell II" has already been flown by its designer, Flight-Lieut. Comper, who will pilot it in the competitions, and has been found to handle very well indeed, being very stable, yet not too much so, and having at the same time very good manœuvrability. The slow sinking in a stall is particularly noticeable. It is of interest to point out that Flight-Lieut. Comper intends to fly the machine from Cranwell to Lympne *via* Croydon, and that he will carry as "spare pilot" his cousin, Flight-Lieut. E. P. Mackay, who is a navigating officer and a lecturer at the Cranwell Cadet College.

Lieut. Comper commenced his aeronautical career with the de Havilland Aircraft Company. He was later on the staff at the N.P.L. at Teddington, leaving there to go to Cambridge, where he spent three years. Lieut. Comper is now a lecturer at Cranwell, and is in charge of the laboratory there.

The machine produced by the Cranwell Light Aeroplane Club is, it must be admitted, a somewhat rough job compared with the highly-finished professionally-built machines taking part in the competitions, but for an amateur effort it is very creditable, and is the concrete expression of a spirit which we could wish was more general in this country. It is to be hoped that the example set by Cranwell will soon be followed by other similar clubs, and all will wish the designer and constructors of the "Cranwell II" every success, not only in the competitions but also afterwards.

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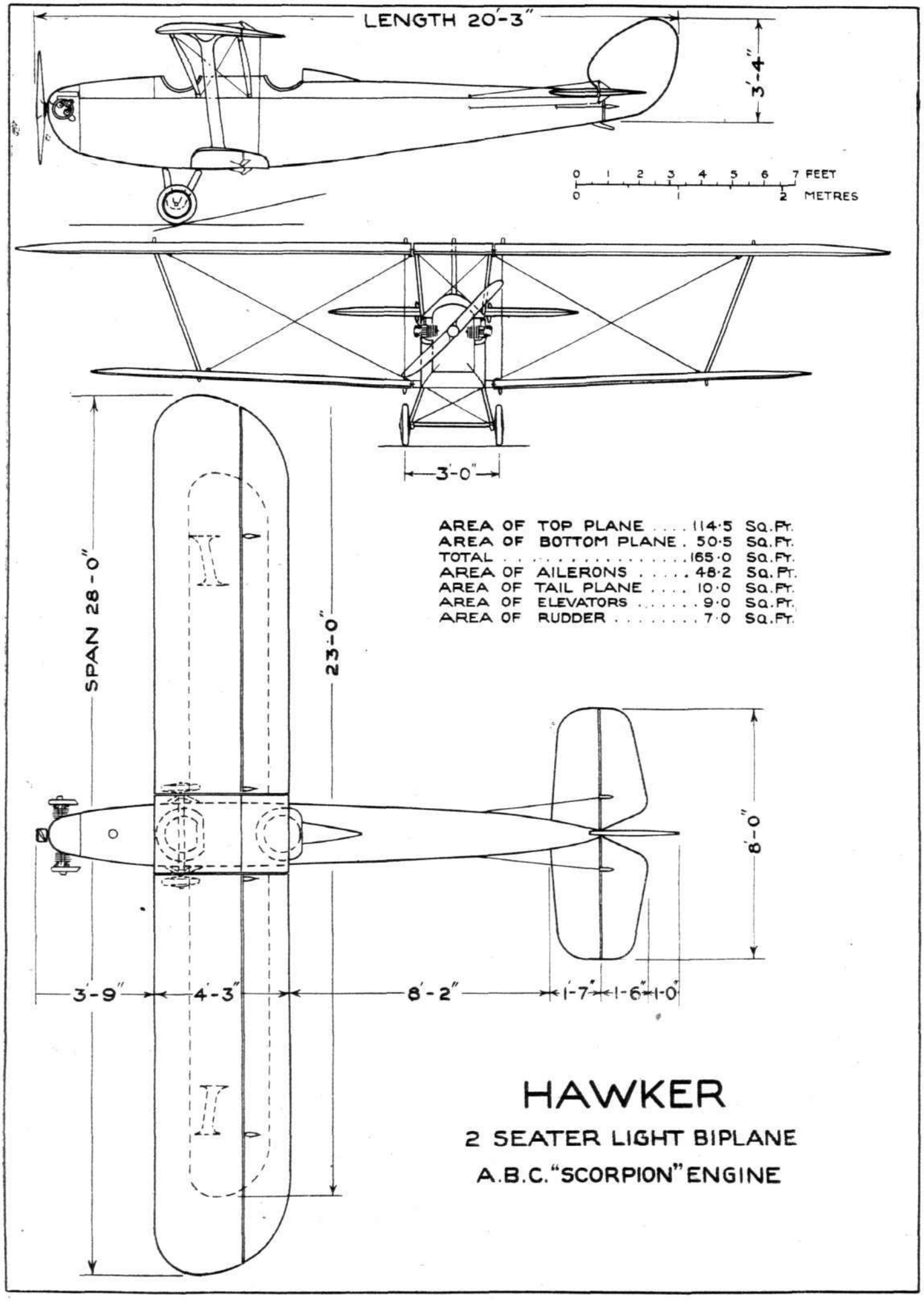
THE SOPWITH-HAWKER LIGHT BIPLANES (NOS. 14 AND 15)

A.B.C. "Scorpion" and Anzani Engines

As the first light 'plane to be designed and built by the H. G. Hawker Engineering Co., Ltd., of Kingston-on-Thames, considerable interest attaches to the two machines that have been entered by this firm for the Lympne competitions. The old Sopwith firm had a reputation for light construction, and it is significant that the same characteristics are to be found in the two light biplanes. So much is this the case that the two Hawker machines will be the lightest of all those taking part in the competitions. The weight empty—*i.e.*, complete with engine, but without pilot, passenger, petrol and oil—is only 373 lbs. Assuming that the engine weighs roughly 100 lbs., the machine itself weighs only about 270 lbs., which is extraordinarily light. How this very low figure for structure weight has been attained will, it is hoped, emerge from the following description. That it is the result of the most painstaking work in detail design will be obvious, and literally not one ounce of unnecessary weight has been allowed to remain in the structure. The total loaded weight is only 730 lbs. As to the outward appearance, this is shown in the general arrangement drawings and photograph given herewith, and it will be seen that the machine is, for a biplane, of extremely pleasing and graceful lines.

The machine is a staggered biplane, with large gap and very small bottom plane. The wing section used is a "thin" one with very high value of L/D maximum, and as the design is very clean the Hawker biplane should have a very good performance as regards top speed. With the light wing loading, and the wing flap gear increasing the maximum lift coefficient, the slow-speed should be very low, so that a very good speed-range figure should be attained.

Structurally, the Hawker machines, which are identical, except that one will have an A.B.C. "Scorpion" and the other an Anzani engine, are of interest on account of the exceedingly careful detail design. The fuselage is a girder consisting of four longerons spindled out to an X-section and braced in the form of a Warren truss by diagonal struts of the same section. The struts are attached to the longerons by three-ply gussets partly riveted through and partly screwed,



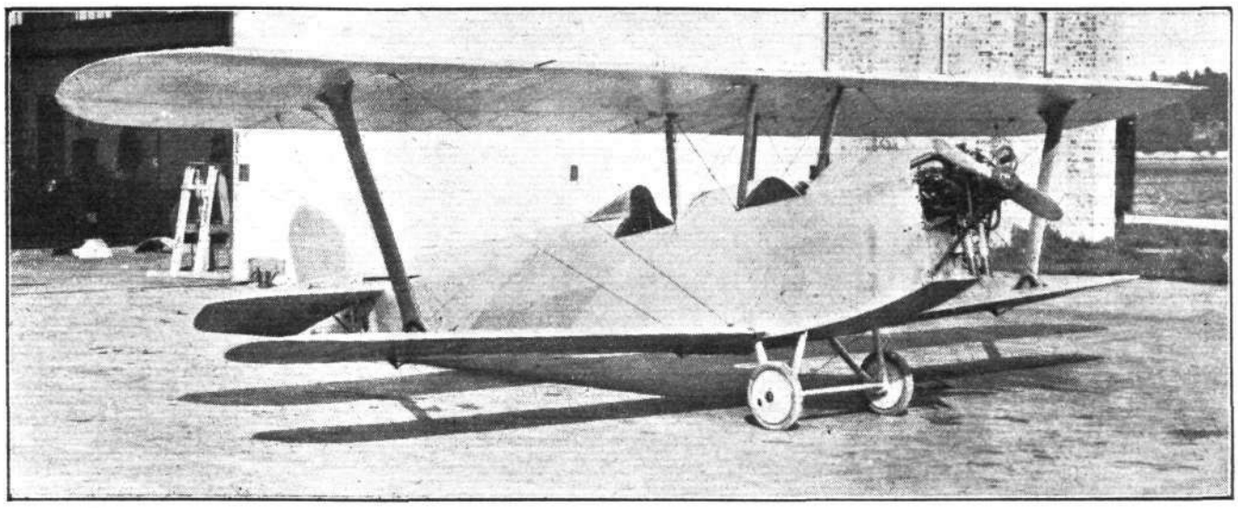
AREA OF TOP PLANE	114·5	Sq.Ft.
AREA OF BOTTOM PLANE	50·5	Sq.Ft.
TOTAL	165·0	Sq.Ft.
AREA OF AILERONS	48·2	Sq.Ft.
AREA OF TAIL PLANE	10·0	Sq.Ft.
AREA OF ELEVATORS	9·0	Sq.Ft.
AREA OF RUDDER	7·0	Sq.Ft.

HAWKER

2 SEATER LIGHT BIPLANE

A.B.C. "SCORPION" ENGINE

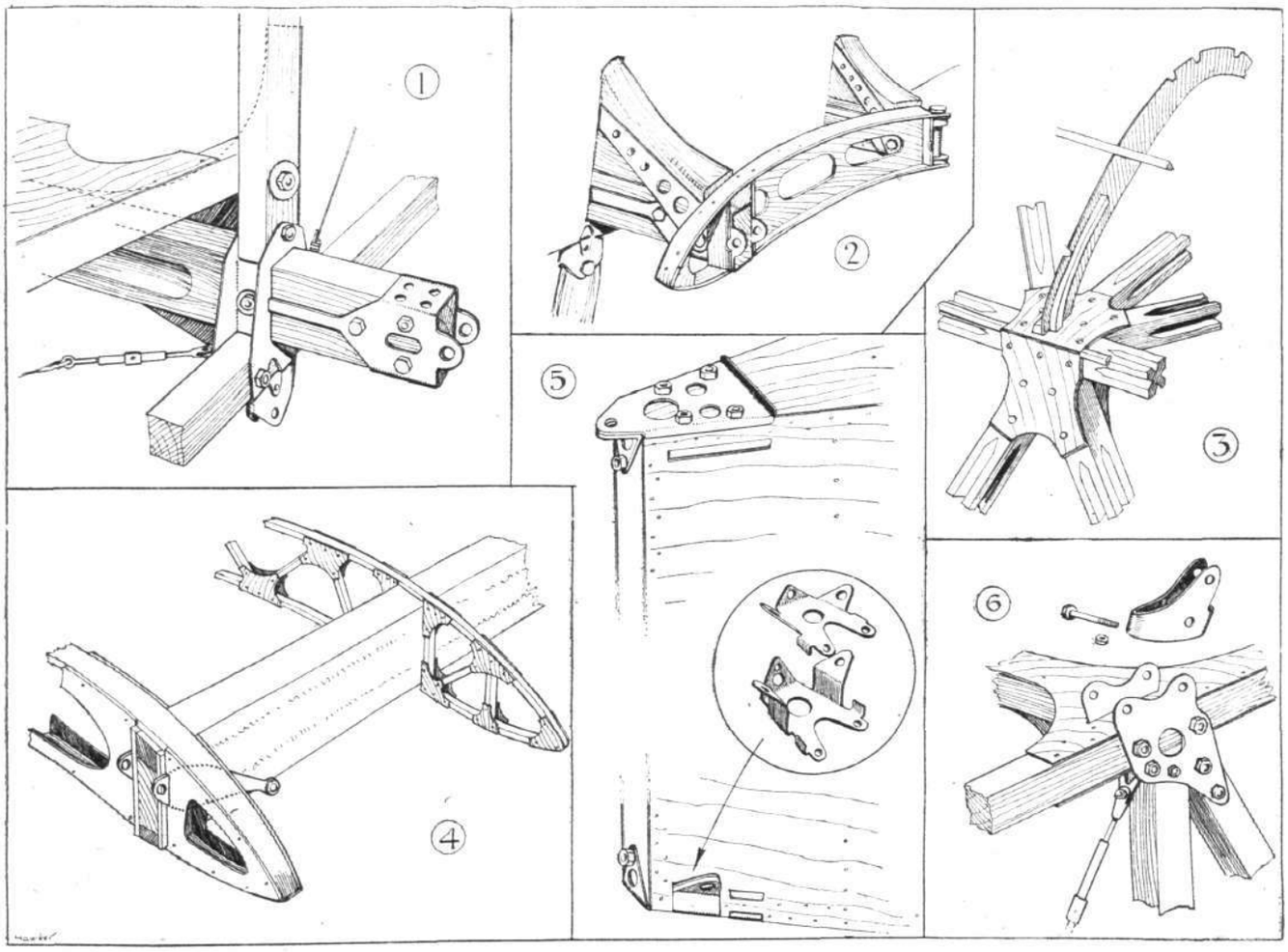
THE HAWKER TWO-SEATER LIGHT 'PLANE : General arrangement drawings, to scale.



THE HAWKER "CYGNET" LIGHT BIPLANE, A.B.C. "SCORPION" ENGINE : Three-quarter front view.

the joint being shown in Fig. 3 of the accompanying sketches. Thus there must have been a considerable saving in weight owing to the absence of metal fittings, while there is no risk of distortion requiring subsequent trueing-up. The sides and bottom are flat, while the deck is cambered, built up of wedge-section stringers on three-ply formers as shown in the sketch. The side panels, over the portion between the two cockpits, are braced by tie rods. The covering is fabric.

The biplane wings, of which the top 'plane has a chord of 4 ft. 3 ins. and the bottom plane 2 ft. 6 ins., are built on box spars of normal construction, over which are fitted the spruce ribs, the latter being of Warren truss construction similar to the fuselage, except that the flanges and ties are of square (*i.e.*, not spindled out) section. The box spars are wrapped in fabric. The top centre-section is carried on four steel struts with wood fairings, while the bottom plane is attached to short wing roots built into, or rather underneath, the fuselage, as shown in sketches 1 and 2. Provision is made for folding the wings, a light jury strut being fitted beween upper and lower front spars. The inter-plane struts are of spruce, and are of the "I" type. They have a considerable outward rake.



SOME CONSTRUCTIONAL DETAILS OF THE HAWKER LIGHT TWO-SEATER BIPLANE : 1 shows a typical fitting attaching the lower front spar to the lower longeron. In 2 is shown the manner in which the projecting spar roots are strengthened and streamlined. Note the hinge on the rear spar for folding the wing. The fuselage construction, using X-section longerons and struts connected by three-ply gussets, is shown in 3, while details of the wing construction are shown in 4. Examples of bent plate work in the region of the stern post are illustrated in 5, and 6 shows the flat plate fitting at the point of attachment of the centre-section struts to the fuselage longeron.

In order to gain a little on the low-speed, variable camber wing flaps are fitted—*i.e.*, the ailerons run the whole length of the wing and are pulled down together, while still retaining their differential action, by so arranging the longitudinal rocking shaft that it is hinged at its forward end, while the rear end can be raised and lowered by a small worm gear. In raising this shaft the lower cables are pulled in while the upper are paid out, the flaps thus being pulled down.

The undercarriage is of the simple vee type, with plain rubber cord shock absorbers.

The tail consists of tail plane, elevator and balanced rudder.

The A.B.C. and Anzani engines are mounted on very light supports in the nose of the fuselage, and the petrol and oil tanks are carried in the deck fairing behind the engine bulkhead.

The workmanship put into the Hawker light 'planes is of a very high order of excellence, and, barring accidents, the machines should do well in the competitions. They will be piloted by two of the best pilots it has been possible to find—*i.e.*, Raynham and Longton, both of whom, in addition to being pilots of vast experience, have done a considerable amount of flying on light 'planes.

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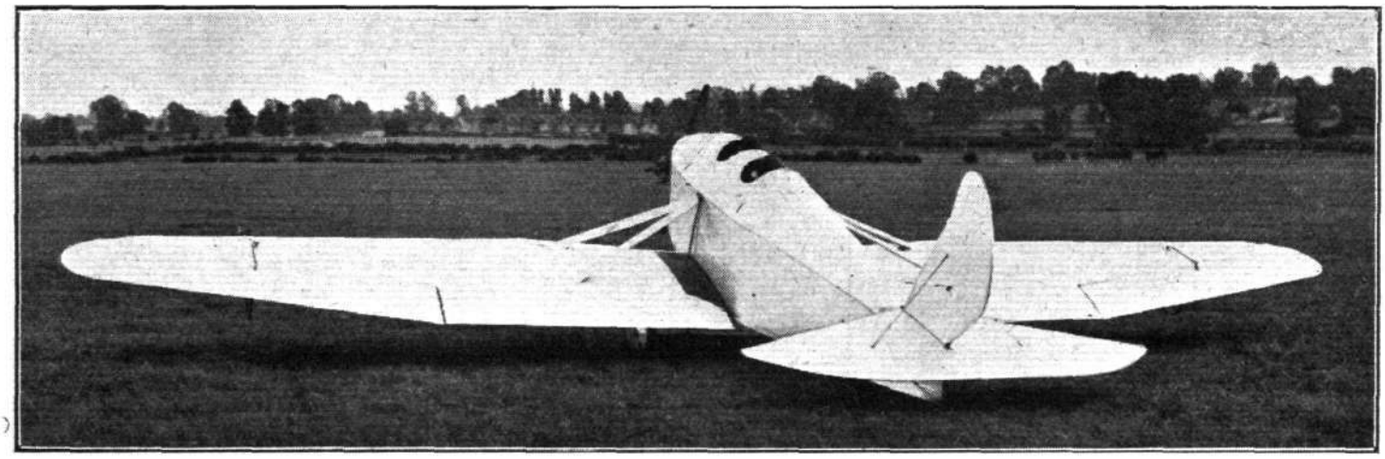
THE PARNALL "PIXIE III" LIGHT MONOPLANE (No. 17)

Bristol "Cherub" Engine

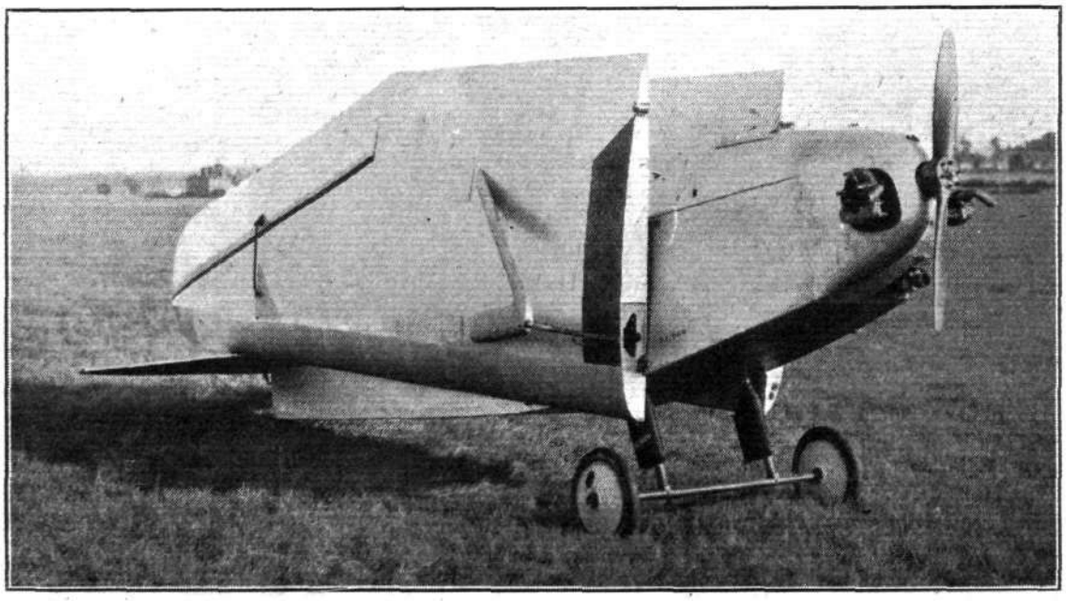
THE two machines entered by George Parnall and Co., of Bristol, are identical, except that by adding a top plane one is converted into a biplane. The original machine remains unchanged by this addition, the necessary fittings being provided on fuselage and wings, and the original wing structure taking the stresses transmitted to it from the top plane *via* the inter-plane struts. In general lines the Parnall two-seater monoplane is similar to last year's single-seater, and constructionally also much the same principles have been adopted.

Fundamentally, the Parnall monoplane two-seater is a low-wing monoplane with strut bracing and wings tapering in chord and thickness. The chord is uniform for approximately half of the span, and then the two spars converge to a point at the tip, the front spar running straight while the rear spar slopes forward to meet it. This it will be remembered, was a feature of last year's machine, and was chosen by Mr. Bolas as giving a torsionally stiff structure. The rear spar is pin-jointed where the change in direction occurs, giving zero bending moment at the joint. It would appear likely that aerodynamically the taper is also beneficial, so that there is very good reason for an arrangement which must necessarily be somewhat more costly to construct than one in which all ribs are alike. The wings taper in thickness from a maximum depth at the point of the strut attachments to a small depth at tip and root.

The main wing spars of the Parnall "Pixie III" are of box section, as shown in sketch 5, and narrow strips are screwed to the flanges externally on which rest the three-ply webs of the ribs, thus relieving the flanges of shear loads. The rib flanges, incidentally, are of the divided type, over the nose portion, the webs rising to the full depth of the wing section.

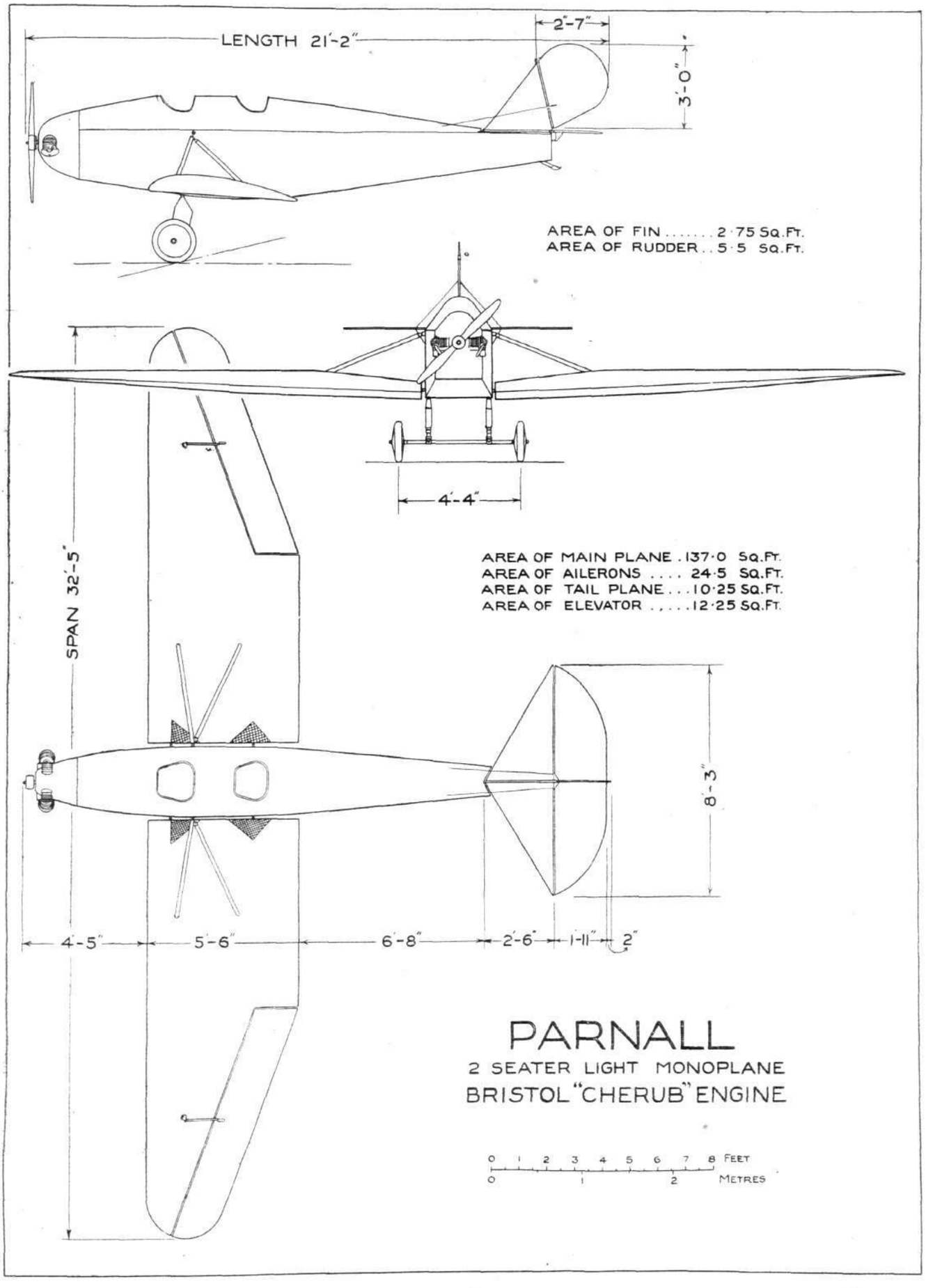


THE PARNALL "PIXIE III," BRISTOL "CHERUB" ENGINE: Three-quarter rear view. This machine can be converted into a biplane.



The Parnall "Pixie III," with wings folded for transport. Note the neat cowling around the Bristol "Cherub" engine. The cantilever undercarriage should be observed.

FLIGHT
AIRCRAFT ENGINEER AND AIRSHIPS



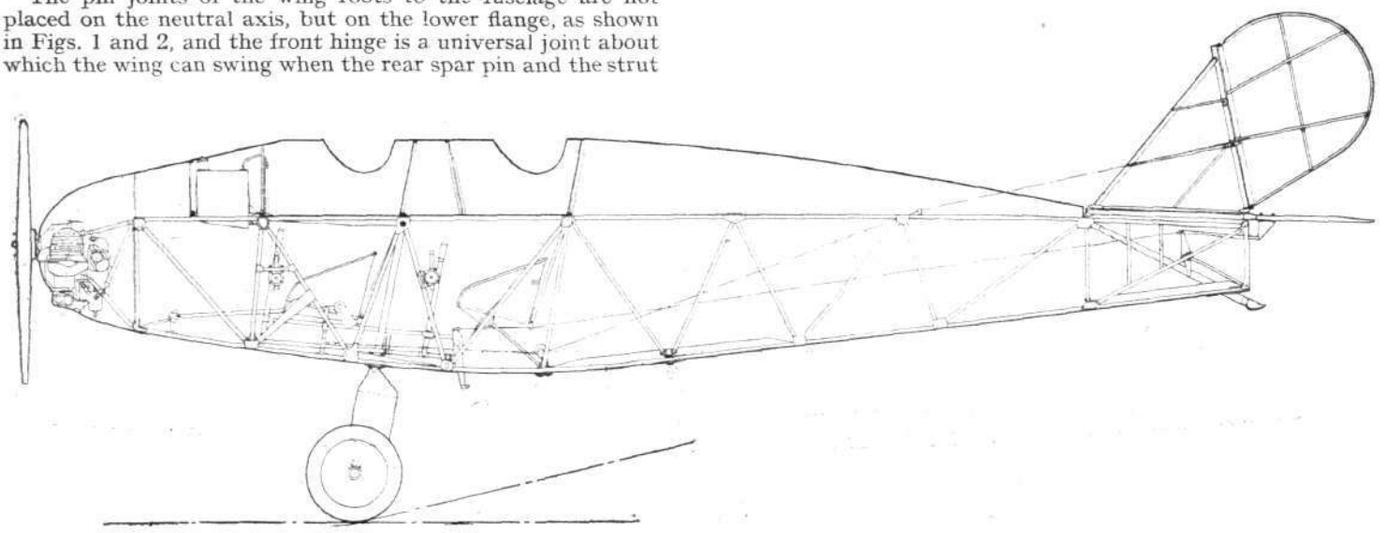
THE PARNALL TWO-SEATER LIGHT MONOPLANE. General arrangement drawings, to scale.

Tie-rod drag bracing is employed, and it is of interest to note that the lift struts are attached not direct to the spar flanges, as is usually done, but to the tubular drag struts. The arrangement is shown in sketches 5 and 6. This form of attachment avoids all twisting stresses on the spars, and as the strut fittings are placed close to the spar walls the tubular drag struts are not subjected to bending loads but merely to shear.

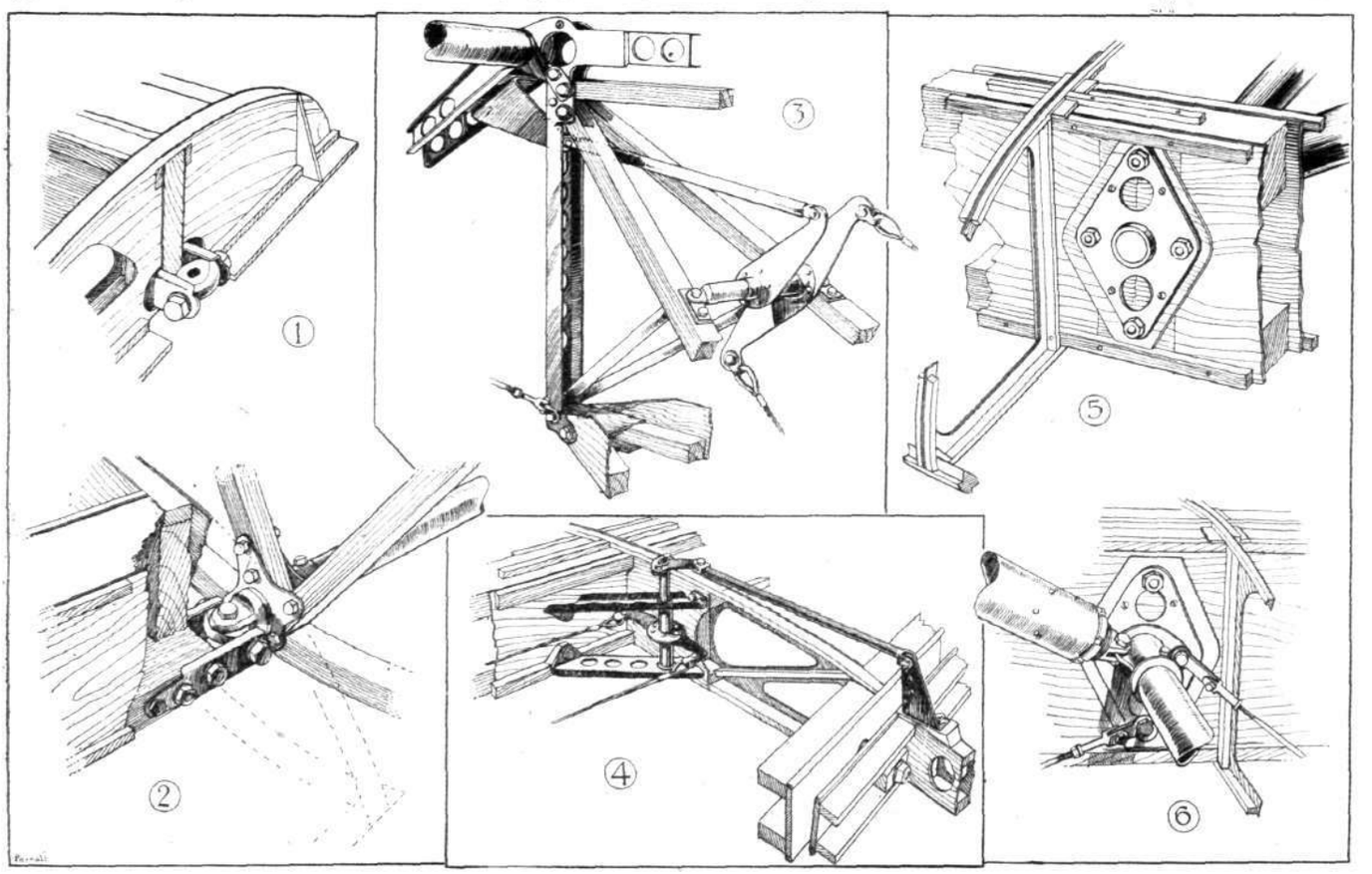
The pin joints of the wing roots to the fuselage are not placed on the neutral axis, but on the lower flange, as shown in Figs. 1 and 2, and the front hinge is a universal joint about which the wing can swing when the rear spar pin and the strut attachments are cast adrift. The wing can then be tilted with its trailing edge upwards, and can be folded back along the sides of the fuselage. The machine is shown with wings thus folded in one of our photographs.

Fig. 4 shows parts of the differential aileron control. The cables pass from the cockpit along the wing to a double-crank lever mounted on a vertical tubular pillar. At its upper end this pillar carries another small (single) crank, from which a short tube runs to the aileron crank on top of the wing. By suitable setting of this crank a differential movement is imparted to the ailerons—*i.e.* the rising one moves through a greater angle than the dropping one.

The fuselage is of similar construction to last year's single-seater "Pixie," and consists of four longerons braced by triangulating struts attached by three-ply gussets. This form of construction gives a very light structure, and requires no trueing-up once it has left the stocks. A side elevation of the fuselage is given, from which, in conjunction with what has already been said, the construction of the fuselage should be fairly clear. At the stern the fuselage terminates in a vertical knife-edge formed by a channel-section metal strip. The short elevator control tube passes through an opening in this strip from the arms of the short layshaft inside the

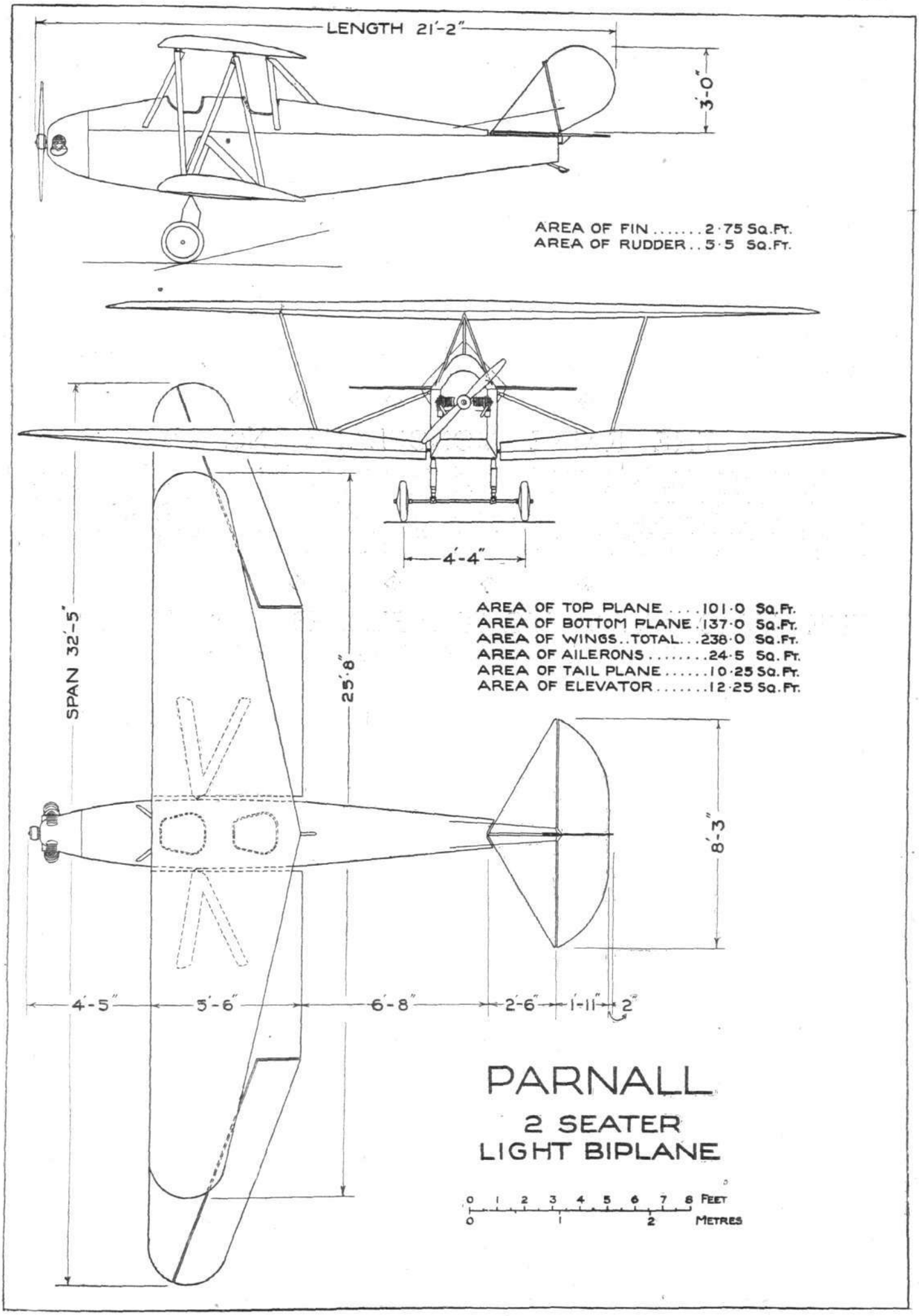


Side elevation of the Parnall two-seater light monoplane.



SOME CONSTRUCTIONAL DETAILS OF THE PARNALL TWO-SEATER LIGHT MONOPLANE: 1. A wing root, showing trunnion for attachment to fuselage. 2. The wing in place, showing attachment. 3. Lay shaft and cranks of the elevator. The tail plane tube has been omitted for the sake of clearness, as has also the tail skid, which is made from cane. 4. Details of the differential aileron control. The two cables run to the controls in the cockpit. 5. Shows the spar construction. 6. The lift tubes are attached not direct to the spar, but to the tubular compression strut of the drag bracing, so that the angularity of the lift strut does not produce twist in the spar.

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS



THE PARNALL TWO-SEATER LIGHT BIPLANE: General arrangement drawings, to scale. The engine shown in the drawings is a Bristol "Cherub," but in the competitions an Anzani will be fitted. This machine is simply the Parnall light monoplane with top plane added.

fuselage, so that the elevator has but one crank, placed underneath and just aft of the stern post.

The undercarriage is of very simple type, and consists of two "legs" of steel tubing running through the floor and up to the top longerons where the upper ends are anchored To these tubes, at the lower end, the axle is secured, and there is neither lateral nor fore and aft bracing, the "legs" and axle being all cantilevers. The "legs" have an oleo-pneumatic type of shock absorber incorporated in them giving a fair amount of travel so that what with the movement of the telescopic tubes and the deflection of the axle the springing should be all that can be desired. The tail skid consists simply of three pieces of Malacca cane, each forming a 120-degree sector, glued and taped together. It is extremely light, but should be well up to its work.

The Bristol "Cherub" engine is mounted on a tubular structure in the nose of the fuselage, and is, as the photograph shows, entirely cowled-in except for the cylinder heads. The petrol tank is mounted under the deck fairing, behind the engine bulkhead.

Altogether, the Parnall "Pixie III" impresses one as being a most business-like proposition, the simplicity of the structure and the ease with which the wings can be folded and again erected without requiring any trueing-up being particularly valuable features, especially for the private owner-pilot of the future.

The Biplane (No. 18)

Most of the foregoing remarks apply equally well to the Parnall biplane, with the exception that an Anzani engine is fitted, and with such extra remarks as the addition of the top plane requires. Reference has already been made to the fact that the biplane is in all essentials the monoplane with a top plane added, thus converting it into a biplane. FLIGHT suggested more than a year ago that some such arrangement be adopted so that the private owner could use his machine both for carrying an extra passenger and for flying somewhat faster when solo. In the case of the Parnall biplane the addition of the second wing was not so much, we believe, chosen from such considerations as with the idea of providing larger wing area and thus giving a lower landing speed for the purpose of the competition, where a premium is placed on low landing speed. That the top speed will be pulled down somewhat by the presence of the second plane seems likely, but even so it may well be that the biplane will collect more marks than the monoplane. At any rate, it will be interesting and instructive to compare the performance of the two.

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THE RAINE MONOPLANE (No. 13)

OF No. 13, the machine entered by Mr. Frank E. Raine, of Christchurch, we have not been able to obtain any general arrangement drawings, nor any photographs, and but very scant data. We learn, however, that the machine will be a semi-cantilever, low-wing monoplane with compression strut wing bracing. A four-cylinder in line air-cooled engine was designed for this machine, but this could not be got ready in time, and the designer states that "the usual type will be used." The estimated speed range is 38 to 80 m.p.h., and the main dimensions are: Length overall, 21 ft. 9 ins.; span, 38 ft.; wing area, 176 sq. ft.; total loaded weight, 710 lbs.

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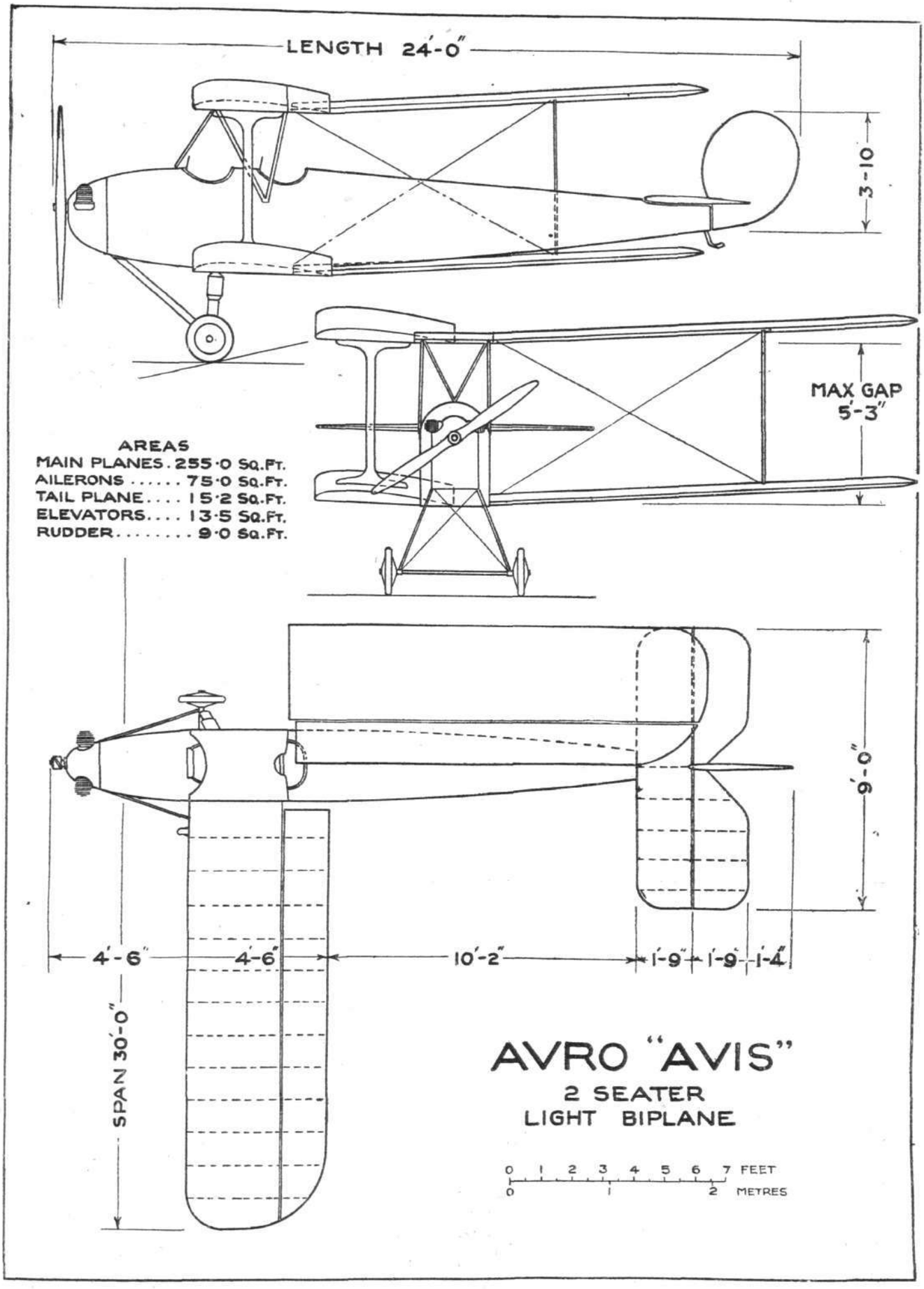
THE AVRO "AVIS" LIGHT BIPLANES (NOS. 10 AND 11)

Bristol "Cherub" and Blackburne Radial Engines

ALTHOUGH two machines have been entered by A. V. Roe and Co., Ltd., there will, in reality, be only one machine flying, and the reason for entering the machine as two different ones was that by so doing it became possible to use two different engines, thus avoiding "putting all one's eggs in one basket," so to speak. Last year, it may be remembered, the Avro monoplane flown by Hinkler had an extra pair of wings of smaller area than the standard, but the machine was not permitted to fly in the competition as it had not been separately entered. To guard against a recurrence of some such dispute, two machines were entered, although actually but one will be flying, but with different engines. The engines chosen are the Bristol "Cherub" and the Blackburne radial. Our general arrangement drawings show the machine with the "Cherub," while the photographs illustrate it with the Blackburne installed, so that an idea of both arrangements should be obtainable.

Remaining a true Avro in general lines, the "Avis" nevertheless shows many novel and interesting features, especially as regards the wing bracing. It is an equal-span, equal-chord biplane with a single I-strut on each side, but with only one set of bracing wires. A "thin" wing section is used, built up with I-section spars and Warren girder ribs. The drag bracing is solid piano wire, but an unusual feature is found in this bracing close to the I-strut attachment. From about the centre of the strut, or rather the special rib under the foot of the strut, diagonal struts run to front and rear spars. Where the struts meet the spars a fore-and-aft tie-rod is placed in a position usually occupied by a compression member of the drag bracing. The stresses are

THE AVRO "AVIS": Three-quarter rear view. Note the single bracing.



THE AVRO "AVIS" LIGHT BIPLANE: General arrangement drawings, to scale. One machine will be fitted with a Bristol "Cherub," and the other with a Blackburne three-cylinder radial.

transmitted evenly to front and rear spar and extra stiffness added to the structure. The lift wires, which like the anti-lift wires are in duplicate but placed in close proximity to one another, are attached at their lower end to the fuselage at a point between the spars, and this point of the inner rib is also anchored to the fuselage, so that this rib is supported in three instead of two places. The peculiar bracing arrangement, while making folding a little more difficult on account of the extra supporting wire needed in the folded condition, should save a fair amount of head resistance. It may be recollected that on a small Avro biplane with back-swept wings, flown by Raynham in 1914, a similar system of bracing was adopted, and the form is one which would appear to have certain advantages, although at first sight it looks somewhat startling. Certainly it reduces to a minimum the exposed portions of the biplane bracing, and except for going into cantilever wings it would be difficult to imagine a "cleaner" biplane. The top centre-section has tubular spars and struts but ordinary wood ribs. In order to give access to the front cockpit the strutting of the centre-section is somewhat unusual. The spars are supported on two vees, one on each side, while the front spar is laterally braced by tubes converging on the centre-line of the fuselage, ahead of the front cockpit.

The ailrons run the whole length of the wings, and have a large diameter Duralumin leading edge forming a torque tube operated by cranks at the inner end. Variable flap gear is provided, the rear end of the longitudinal rocking shaft being raised and lowered by a worm. This worm gear is very beautifully carried out, and is illustrated by sketches. It will be seen that as the shaft is raised, the cranks are raised with it and the flaps depressed. The differential action is still retained. Only the bottom plane flaps are directly operated, the top flaps being connected to them by struts near the inner end. The wings are arranged for folding, the hinge pin being moved into a steel bracket off-set from the centre-line of the spar when the wings are folded. When spreading the wings this bolt is withdrawn and put into the hole on the centre-line.

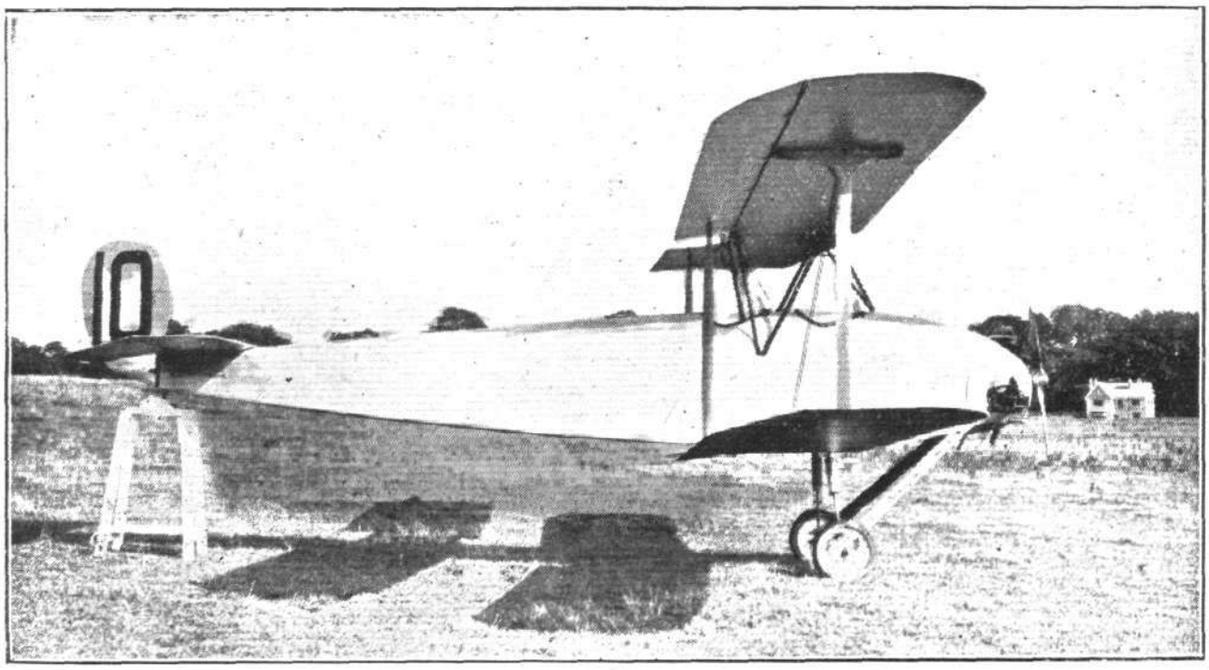
The fuselage is of similar construction to last year's Avro machines—*i.e.*, square-section longerons with Warren girder strut bracing, secured by three-ply gussets or "biscuits" as they are sometimes called. This form of construction seems to be becoming popular for light 'planes, and it certainly avoids the necessity of trueing-up after hard use. The fuselage is fabric covered, except for the deck fairing, which has a three-ply covering underneath the fabric.

Controls are of usual type, with wood "joy-sticks," but the foot bars are rather ingeniously arranged to give a parallel movement. In a narrow fuselage it is difficult to provide against the pilot's foot slipping, owing to the great angle of a short foot bar. In the Avro "Avis" a parallel link motion is imparted to the front foot bar, which is somewhat shorter than the rear one, and the pilot's feet do not rest on the bar itself but on stirrups which always remain at right angles to the centre line of the fuselage.

THE AVRO "AVIS": View of the engine mounting, undercarriage, etc.

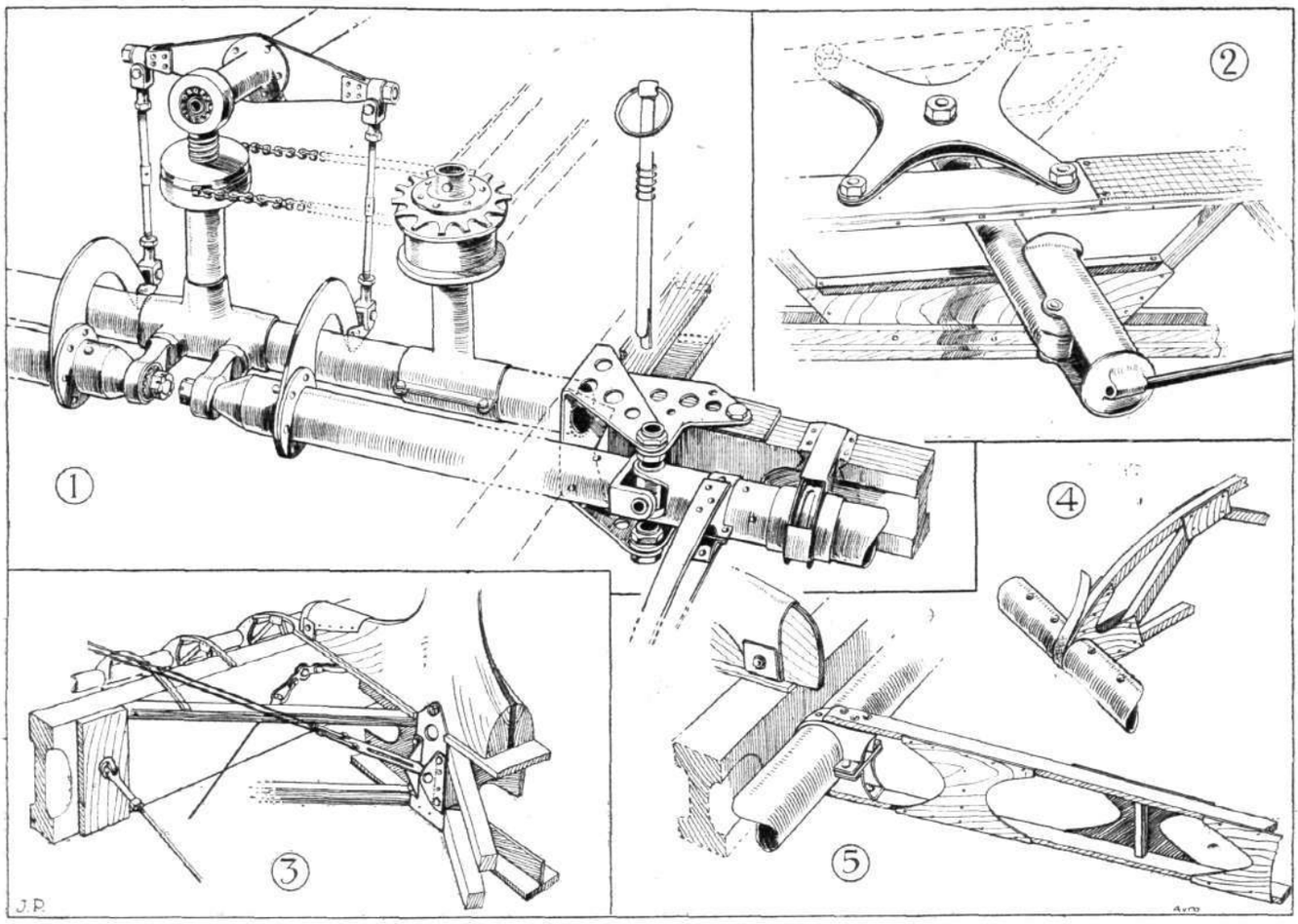
An oleo undercarriage with very long travel is employed, the front chassis struts acting as radius rods for the axle. In proportion to the wing span the wheel track is fairly wide, and with the good shock absorbing properties of the oleo gear the machine should handle well on the ground and should stand up to some fairly rough landings such as it might receive in school work and, incidentally, in the low-speed tests at Lympne. Lateral bracing is between front struts only.

The Avro "Avis" will be piloted in the competitions by Hinkler, and in view of the clean design and the wing flap gear the speed range should be considerable. The workmanship is very fine, and especially so that put into the variable camber gear, which as a matter of fact looks almost too good and perfect for a school machine.



THE AVRO "AVIS," BLACKBURNE RADIAL ENGINE: Side view.

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS



THE AVRO "AVIS." SOME CONSTRUCTIONAL DETAILS: 1, the very beautifully-made wing flap gear. Rotation of the worm gear raises the longitudinal shaft, and with it the crank joined to the two wing flap cranks. The result is that both ailerons are depressed. Shafts, etc., work in ball bearings. 2 shows how a parallel movement is imparted to the stirrups of the front foot bar. In 3 is shown, cut through to show the construction, the foot of the inter-plane I-strut. Note the unusual bracing, with struts running diagonally to the spars and a tie-rod from front to rear spar. 4 shows the rib construction and attachment to tubular leading edge, and 5 an aileron and its attachment to the Duralumin torque tube.

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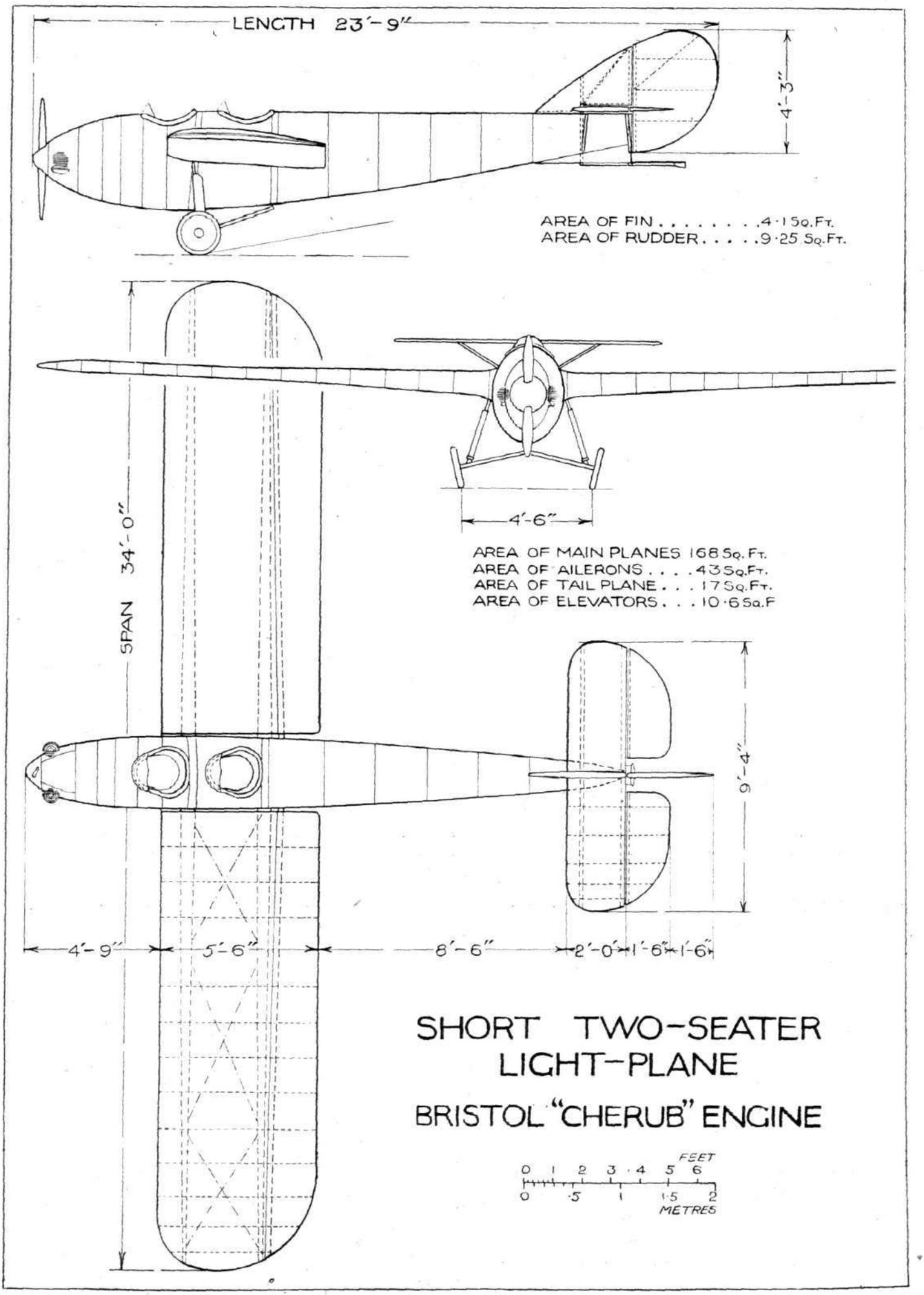
THE SHORT LIGHT MONOPLANE (NO. 8)

Bristol "Cherub" Engine

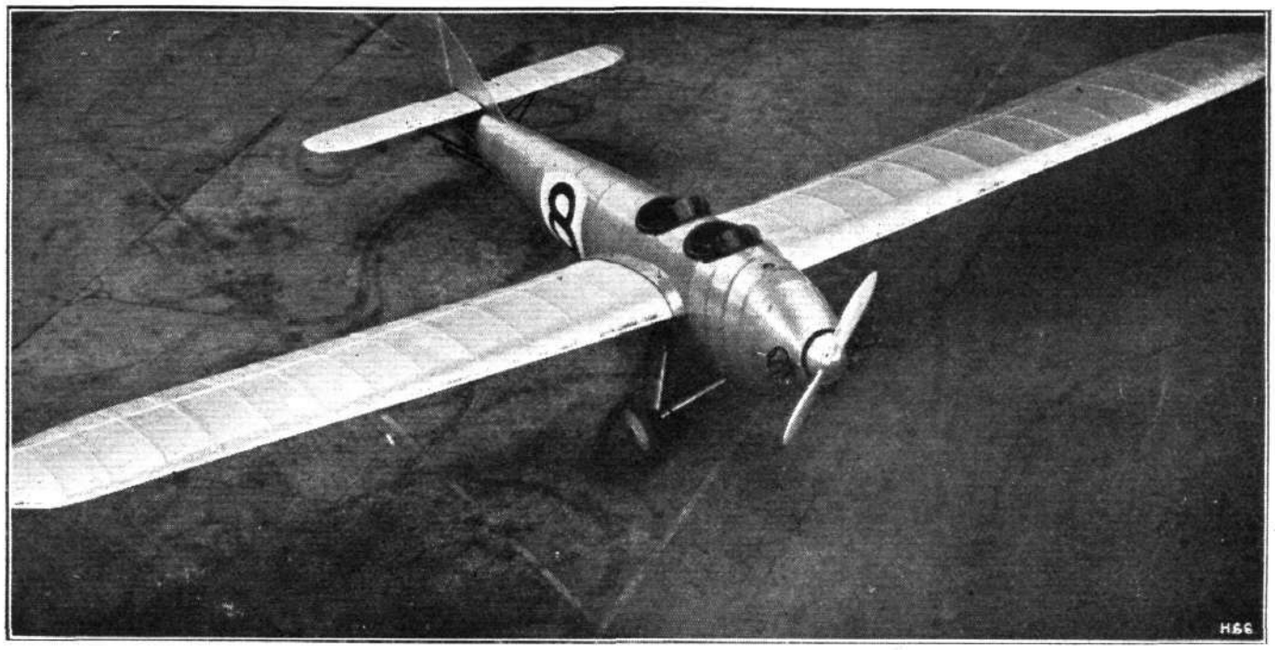
THE very pretty monoplane entered by Short Brothers of Rochester is already known to readers of FLIGHT, a description and a full-page scale drawing having been published in our issue of July 24, 1924. The machine is a "normal" (*i.e.*, neither "high-wing" nor "low-wing") monoplane two-seater, fitted with Bristol "Cherub" engine. From the accompanying illustrations it will be seen that the machine is of exceptionally clean lines, the photographs particularly illustrating this point. Aerodynamically, therefore, the machine should be very efficient, and the estimated performance figures published in our previous article will in all probability be considerably improved upon during actual flying tests.

Constructionally the machine is of more than usual interest on account of the all-metal fuselage, which incorporates features similar to those of the famous Short "Silver Streak" and "Springbok" larger aeroplanes. This form of construction, which has not been developed as rapidly as it might have been on account of the Air Ministry's objection to the use of Duralumin in aircraft construction, is remarkably simple, and certainly appears to provide a "cleaner" structure, with a minimum of parts, than the more usual forms of metal construction.

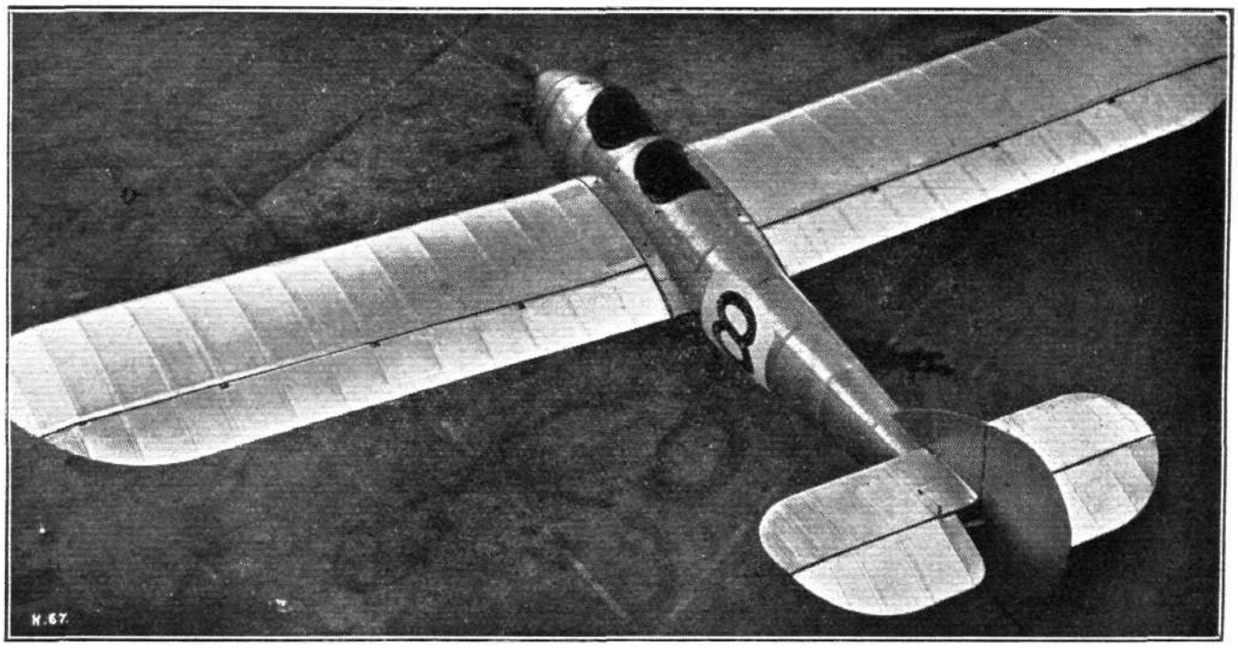
Fundamentally, the Short method of fuselage construction (and the same principles are now being applied to flying boat hull construction) consists in making the outer skin or covering part of the stress-resisting structure. The skin, of sheet Duralmin, is applied in short panels which wrap around the fuselage contour (of elliptical cross-section) and is attached to "L"-section rings or formers lying in a transverse vertical plane. The fact that it is impossible, without beating or some other form of shaping, to bend sheet material around a sphere, although it bends, of course, readily around a cylinder, necessarily means that the Short fuselage is not really in the form of a smooth curve, longitudinally, but is in a series of straight lines. The angle which adjacent straight lines make with each other are, however, so flat that to all intents and purposes the outward form *is* a curve. Where a sharp change in the direction of the curve occurs the covering sheets are kept very narrow, as indicated in the general arrangement drawings, while a gentle curve allows of using wider sheets. The sheets are riveted to the "L"-section formers, and, in order to stiffen the skin against compression loads, "V"-section stringers are riveted to the skin between the rings or formers. These stringers do not, however, run through from end to end, as in a flying boat, for instance, but are interrupted at the formers. Owing to the curvature of the fuselage, which already by itself stiffens the skin considerably against compression loads, the fact that the stringers are not continuous probably does not matter in the slightest, and the resultant simplicity of construction would appear to be well worth, if necessary, a little extra thickness in the skin. Certainly we have never, in any country, seen a fuselage structure more free from projections, bracing and other encumbrances than that of the Short "Satellite." Whether



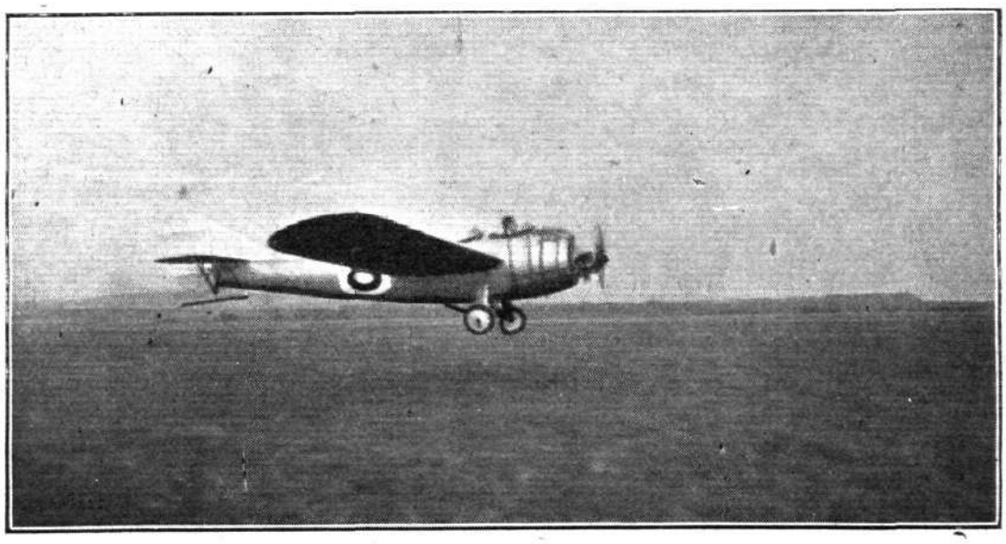
THE SHORT "SATELLITE" LIGHT MONOPLANE, BRISTOL "CHERUB" ENGINE: General arrangement drawings, to scale.



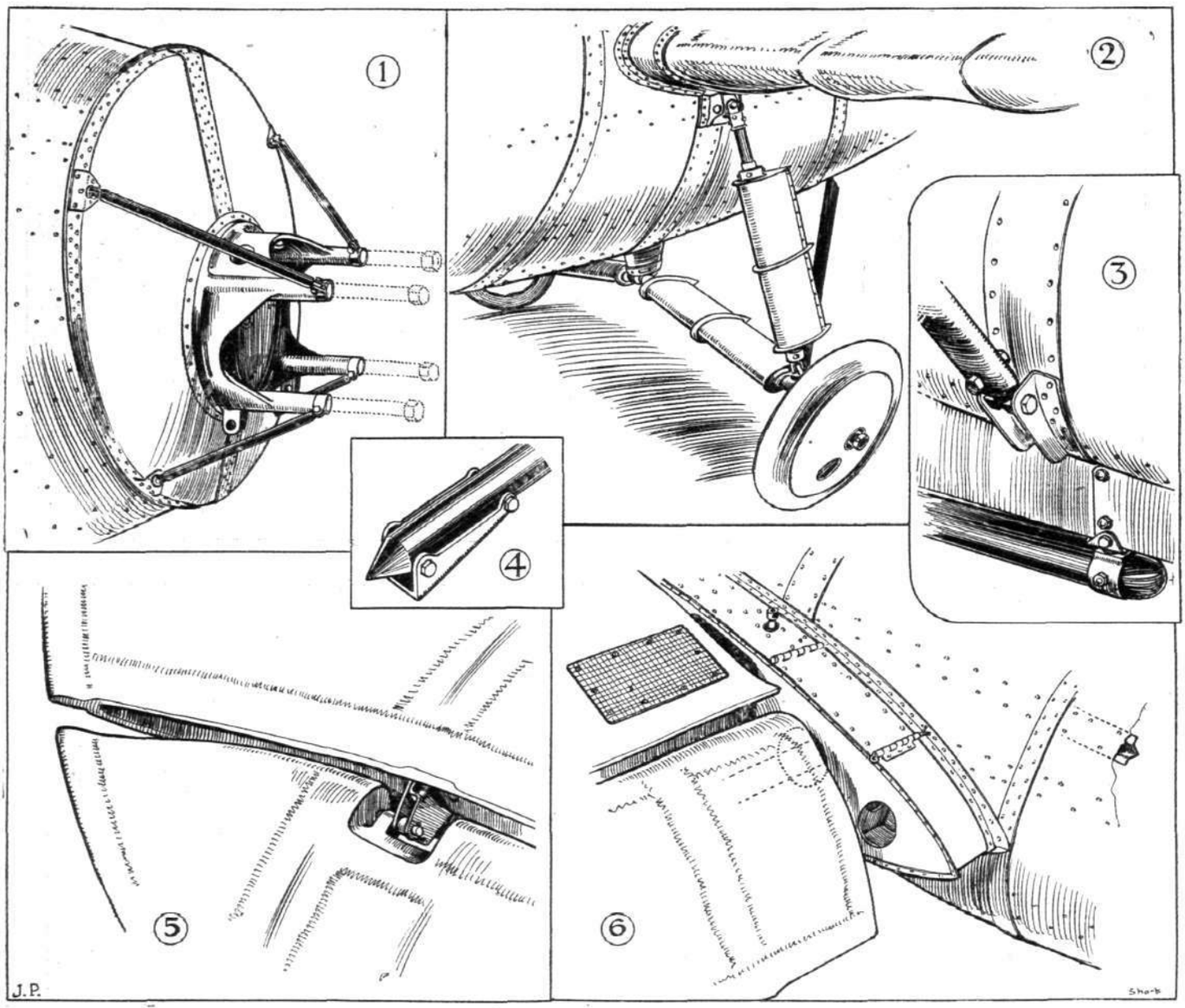
THE SHORT "SATELLITE," BRISTOL "CHERUB" ENGINE: Three-quarter front view from above.



THE SHORT "SATELLITE": Three-quarter rear view, from above.



The Short "Satellite" starting on a flight.



SOME SHORT CONSTRUCTIONAL DETAILS: 1. The very neat engine mounting for the Bristol "Cherub." This mounting should be particularly good in respect of torsional stresses. 2. The oleo undercarriage. 3. Attachment of tail skid fixed end to fuselage. 4. The renewable shoe on the free end of the tail skid. 5. An aileron hinge. 6. The port wing root showing inspection doors giving access to wing attachments. The ailerons are operated by torque tubes.

the particular form is as light as it might be for such a small machine is, perhaps, open to discussion, but that the system is well worth developing for larger machines there cannot be the slightest doubt. Even in this small size the weight of the fuselage is by no means prohibitive, although some of the machines entered have managed to reduce their fuselage weight below that of the Short.

We have devoted rather a large amount of space to the fuselage, but we feel that we need not apologise for doing so, as the construction is unusually interesting.

The monoplane wing of the competition machine is built over wood spars, but it appears likely that subsequent machines of this type will have spars made from high-tensile steel strip so as to make the entire construction metallic. In the Lympne machine the spars have flanges of laminated mahogany with walls of three-ply. The ribs are made of Duralmin, built up in the form of a Warren girder. The two wing halves are bolted to strong fuselage frames by fishplates and large-diameter hinge pins so as to facilitate dismantling. The ailerons extend the whole length of the wing, and are operated by torsion tubes and rods. A variable camber device is fitted, which allows of depressing both ailerons together, the differential aileron action being retained.

The undercarriage is of vee type, with rubber shock absorbers in the form of compression blocks incorporated in the front "legs." The axle as well as the telescopic struts is enclosed in streamline casings, as shown in one of our sketches. The front chassis struts are bolted to a strong fitting immediately below the front spar attachment.

The Bristol "Cherub" is mounted on a particularly neat aluminium alloy casting, shown in a sketch. Direct loads are taken by this mounting, assisted by sloping steel tube bracing struts as shown, while torque loads are taken care of by the casting itself. The whole forms a very simple mounting, making the engine readily accessible and allowing of removing the engine in a very short space of time. Behind the engine there is a fireproof bulkhead, aft of which are mounted the petrol and oil tanks. Direct gravity feed is employed.

The photographs on p. 613, which were taken from above, give an excellent idea of the arrangement of the two cockpits in tandem. Owing to the fact that the front cockpit is ahead of the wing root, the view from here should be unrivalled, as the pilot can look straight down past the sides of the fuselage, and the only direction in which there is any obstruction is diagonally downwards and aft. Even from the rear cockpit the view is better than in the majority of machines, and altogether the question of view appears to have been most happily solved in the Short "Satellite."

The controls are of usual type, and in conformity with the regulations they are in duplicate. This applies not only to the normal flying controls, but also the gear operating the variable camber device, which can be worked from either cockpit.

The main dimensions, weights, etc., are given in the general arrangement drawings and in the table on p. 588.

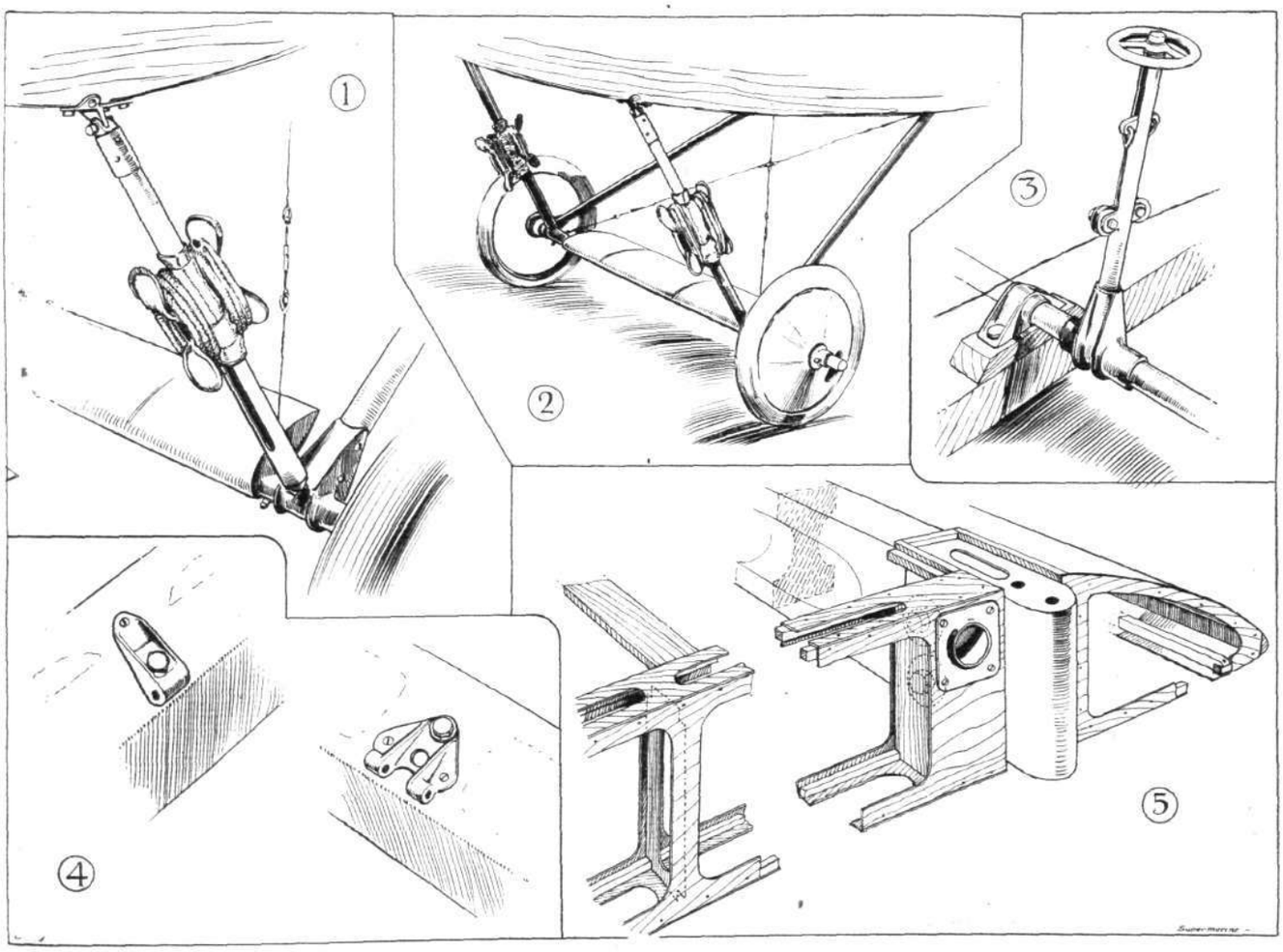
FLIGHT

THE SUPERMARINE "SPARROW" LIGHT BIPLANE (No. 9)

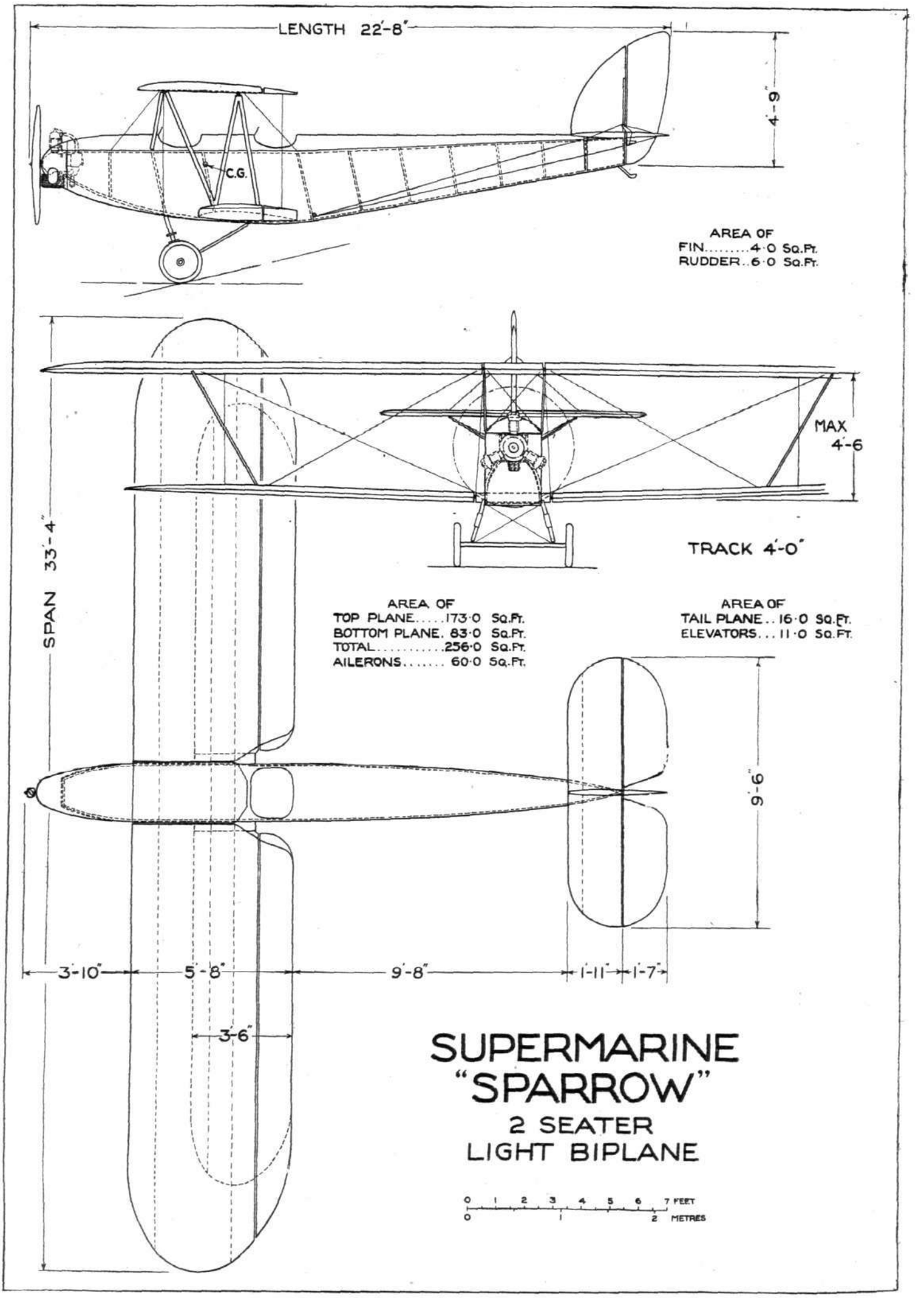
Blackburne Radial Engine

For the first time since the very early days of the firm the Supermarine Aviation Works of Southampton have produced a land aeroplane, all the energy of the firm having hitherto been devoted to the production of seaplanes or amphibian flying boats. It is, perhaps, significant that the first aeroplane of Mr. Mitchell's design should have been a light 'plane, and it is to be hoped that once he has started on light 'planes he will look into the problem of the light seaplane for which, if it be an engineering possibility, there should be at least as good a market as for light aeroplanes.

THE SUPER-MARINE "SPARROW": Three-cylinder Blackburne engine: Three-quarter front view.



SOME SUPERMARINE "SPARROW" CONSTRUCTIONAL DETAILS: 1 shows one of the telescopic legs of the undercarriage. The crutches are covered with leather. 2, the complete undercarriage. 3, the very simple device for setting the wing flaps. Rotating the small wheel shortens or lengthens the positive cables, the balance or return cables having rubber cords so as to adapt themselves to the varying length. In 4 is shown an aileron hinge, while 5 shows the construction of the lower plane.



THE SUPERMARINE "SPARROW" TWO-SEATER LIGHT 'PLANE: General arrangement drawings, to scale. The engine is a three-cylinder Blackburne.

The Supermarine " Sparrow " is a tractor biplane with large top plane and small bottom plane ; single-bay bracing with raked N-struts is employed, and the machine is fairly normal in every way. The power plant is a Blackburne radial engine. We would call attention to a small change which has been made in the rudder since our general arrangements were made. In the scale drawings a high, narrow and rather pointed rudder is shown, while in the photograph it will be seen that the rudder actually fitted is of a more rounded shape.

The fuselage of the Supermarine " Sparrow " is a flat-sided ply-wood covered structure with cambered deck. The top longerons do not, as is usually the case, run quite horizontally, but slope upwards slightly from a point behind the rear cockpit to the stern post. A somewhat similar arrangement is sometimes met with in ships' 'planes, the object being, of course, to allow the machine to pull up very quickly owing to the very large angle which the wings form with the ground. Presumably much the same object was in the mind of Mr. Mitchell when he designed the " Sparrow," and the very large angle, plus the fact that variable flap gear is fitted, should enable the Supermarine biplane to do rather well in the getting off and alighting competitions, as well as in the slow-speed tests. Not that there is any reason to expect that the machine will be inferior in the matter of top speed, but with a wing loading of rather less than 3½ lbs./sq. ft. and fairly standard biplane bracing, it is to be expected that it will shine at the lower rather than at the high end of the scale. On the other hand, Mr. Mitchell has chosen the somewhat unusual arrangement of having different wing sections on top and bottom 'planes, and it appears likely that in this way it is in the power of a designer to make not inconsiderable changes in the slope and shape of the biplane L/D curve.

However, this is rather digressing from the subject of the construction of the Supermarine " Sparrow." Except for the cocked-up rear portion the body is of normal type, and this may be said also of the wing construction. The spruce spars are of I-section, the ribs of standard design, and the drag bracing of piano wire with compression ribs of specially reinforced construction. The ailerons run the whole length of the wings, and are fitted on both planes. Only the lower flaps are operated by cables and cranks, the movement being transmitted to the top ailerons by two struts on each side. The flaps, as already pointed out, are used as variable camber devices, the method of operating them being particularly simple. On the longitudinal rocking shaft carrying the " joy-sticks " is mounted a short column from which run the aileron cables. The inner ends of these cables are attached to a short yoke, having an internal thread engaging with a vertical worm. The upper end of this worm carries a hand wheel, by the rotation of which the yoke is raised and lowered, thereby pulling in or paying out the aileron cables. One of our sketches shows the camber gear.

The undercarriage has telescopic front legs, carrying crutches over which is wound rubber cord. The crutches are protected by leather gaiters, as indicated in Figs. 1 and 2. The axle is enclosed in a streamline fairing.

The three-cylinder Blackburne engine is neatly cowled-in all but the top of the cylinders and the oil sump, built integral with the crank-case. The petrol tank is housed in the deck fairing, and provides direct gravity feed.

Taking it all round, the Supermarine is a sound, straightforward machine, with but few experimental features, but incorporating several very sound ideas. From the user's point of view, the machine should appeal on account of its simplicity, and also for the fact that with the biplane arrangement chosen the view from both cockpits is exceptionally good. The machine should be reasonably cheap to build in quantities.

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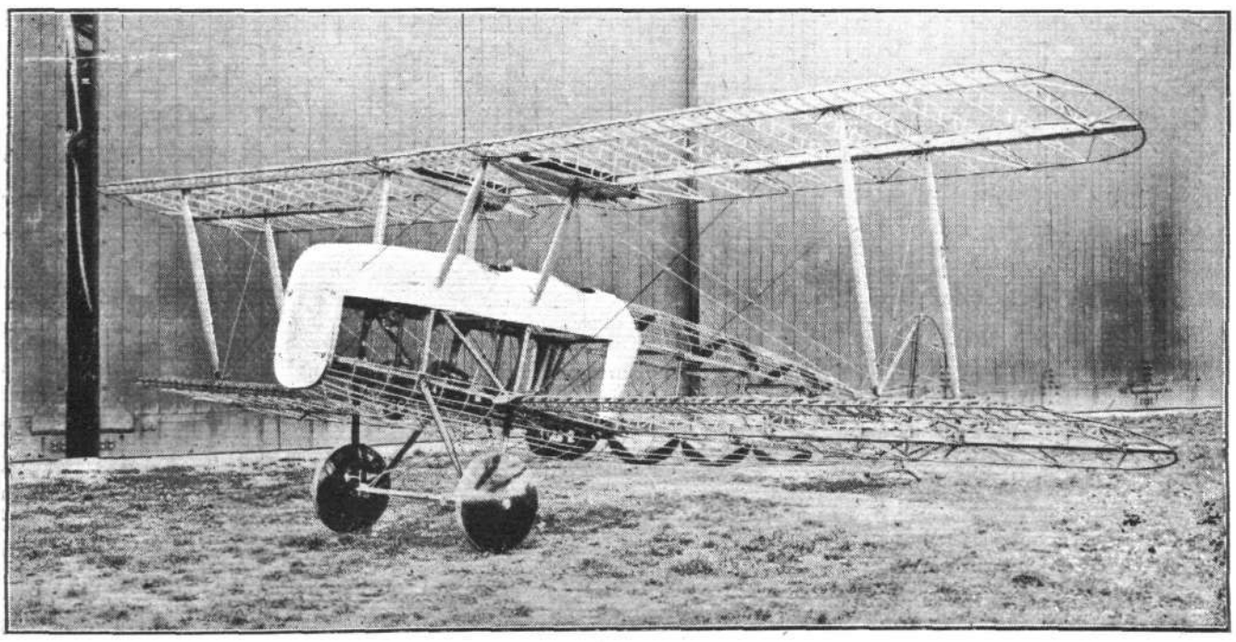
THE VICKERS "VAGABOND" LIGHT BIPLANE (No. 16)

Bristol " Cherub " Engine

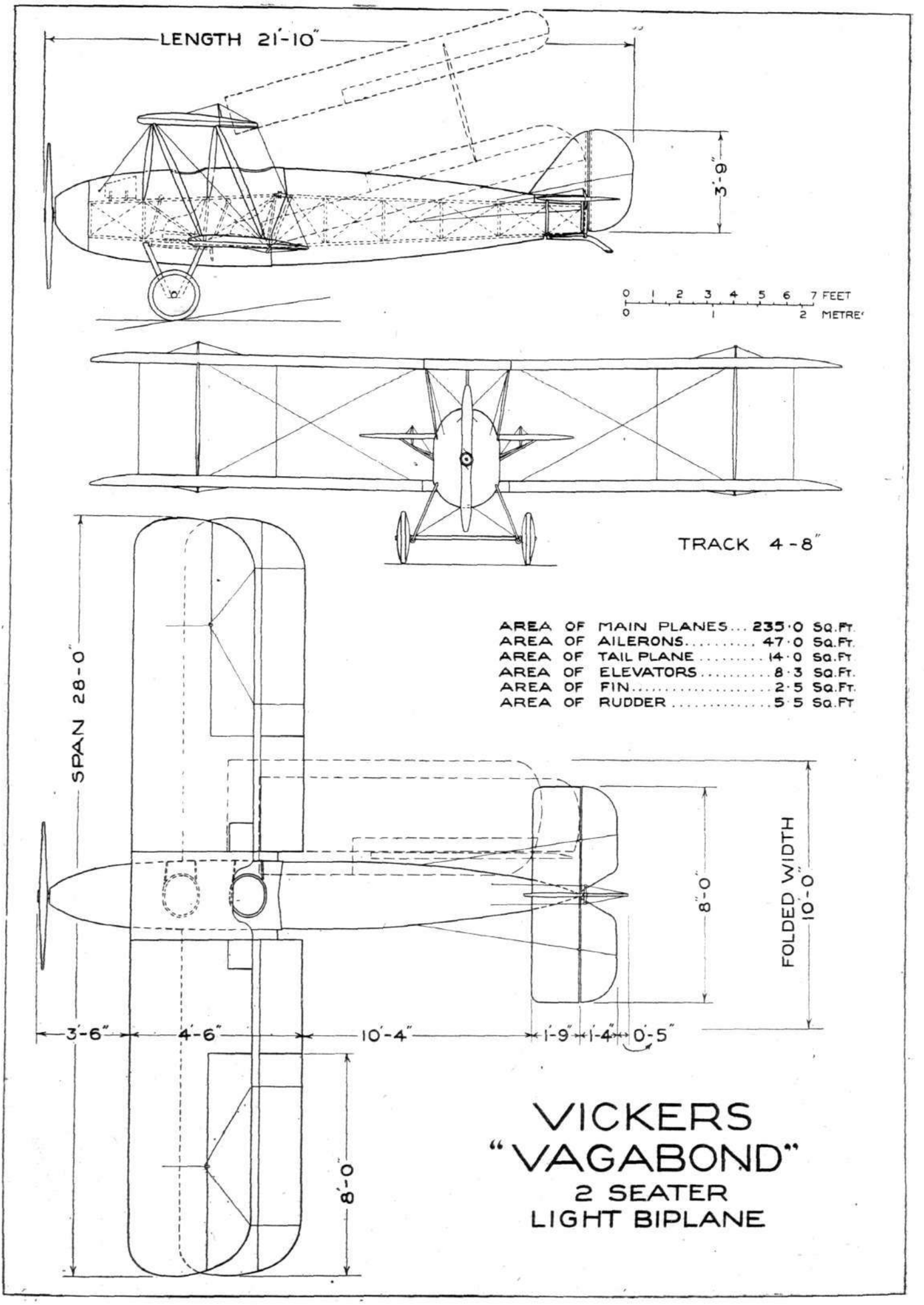
In some respects the Vickers " Vagabond " light biplane two-seater, designed by Mr. Rex Pierson, is a good deal similar to last year's " Viget " single-seater. In the main the forms of construction employed are the same, and even the general appearance, although differing from that of the " Viget," bears a strong family resemblance to the smaller machine. Owing to pressure of work at the Vickers Weybridge works the " Vagabond " was built by A. V. Roe and Co. at their Hamble works, the machine being sent to Weybridge for finishing off and covering.

The Vickers " Vagabond " is an equal-span tractor biplane, characterised by a very pronounced stagger, and by the fact, as distinct from the majority of machines entered, that the bottom as well as the top of the fuselage is faired. The main stress-resisting portion of the fuselage is fairly shallow, as indicated by the dotted lines in the side elevation of the general arrangement drawings, and as shown in the views of the machine in skeleton. It is a girder of spruce longerons and struts, braced by tie-rods. The fuselage fittings are of Duralumin, and are identical with those used on the " Viget." They entirely surround the longerons, and are slid on from the end. The details will be seen in Fig. 2 of the accompanying set of sketches.

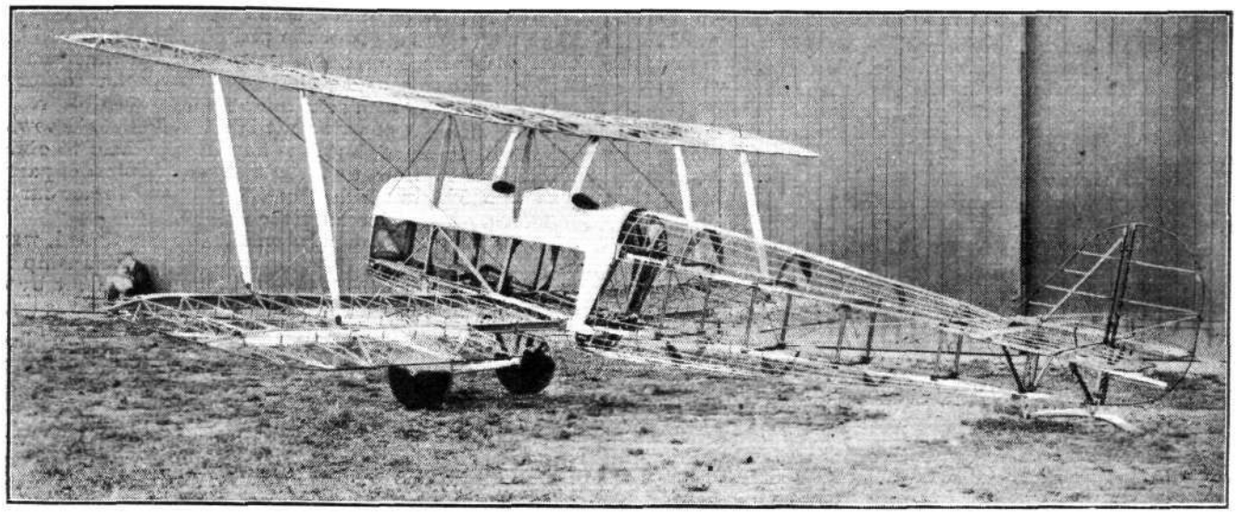
A peculiar feature of the fuselage design is that the top and bottom fairings of the fuselage project past the vertical sides, so that the fabric does not touch the sides of the actual fuselage structure. A particularly smooth surface should result from this arrangement, but, on the other hand, it would appear that when handling the machine on the ground considerable care will have to be taken not to damage anything,



THE VICKERS " VAGABOND " : Three-quarter front view of the machine in skeleton.



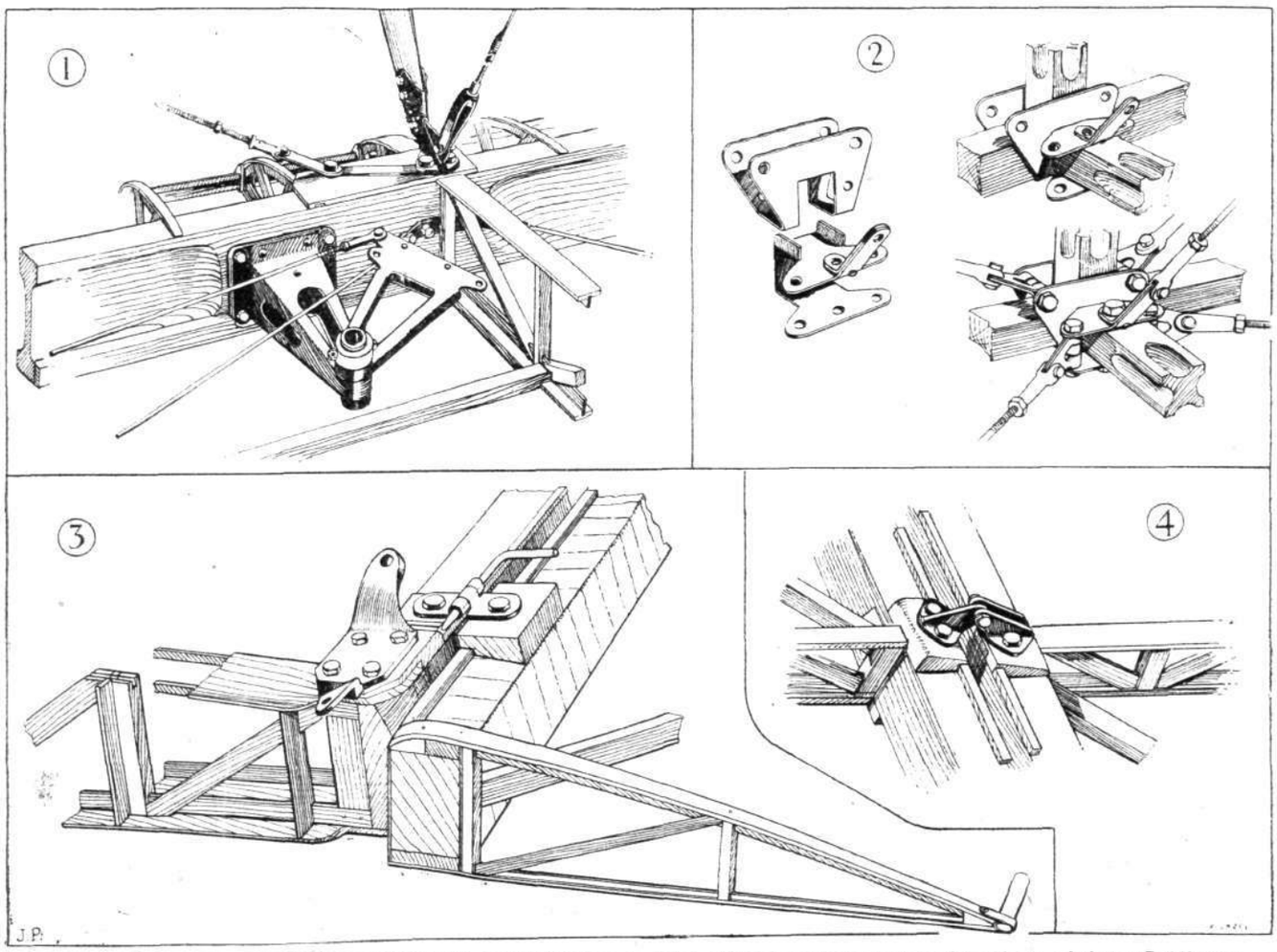
THE VICKERS "VAGABOND" LIGHT 'PLANE TWO-SEATER: General arrangement drawings to scale. No engine is shown in the drawings, but the machine will be fitted with a "Cherub."



THE VICKERS "VAGABOND": Three-quarter rear view of the machine in skeleton.

as the more substantial parts of the structure are not available for lifting. The most original feature of the fuselage structure, however, is that the tail portion, from behind the rear cockpit to the stern post, is separate from and hinged to the front portion. The hinges occur on the lower longerons, while the joint in the top longerons is in the form of a worm and nut gear, which can be operated from either of the two cockpits. The effect of rotating the worms is to lengthen or shorten the top longerons, and thus the tail is lowered or raised in relation to the front portion and wings. Thus for landing the tail will be raised, when the wings make a very large angle with the ground, which should materially assist in pulling up the machine after a very short run. The arrangement, it will be seen, combines the advantages of a trimming tail and a variable incidence.

The wings are of normal construction, with spars of I-section spruce and N-formation ribs. Drag bracing is by tie-rods. The inter-plane struts are of spruce with steel end fittings. The ailerons are operated by tie rods and cranks, no pulleys being employed. The wings are designed to fold, but owing to



SOME VICKERS CONSTRUCTIONAL DETAILS: 1. The aileron crank inside the wing, giving a differential movement to the ailerons. 2. Details of the fuselage fittings. These are similar to those used on the "Viget." 3. The trailing edge is folded with the wings, and is secured by hinges of the form shown. 4. An aileron hinge.

the very pronounced stagger some unusual features have had to be incorporated in order to make the folding possible. From the side elevation in the general arrangement drawings, it will be seen that the effect of the stagger is to swing the wings upwards when folded. In order to reduce this angle the top hinge is not on the rear spar, but on a specially reinforced three-ply box structure some distance aft of the spar.

The bottom hinge is on the spar, but the hinge pin is placed at a considerable angle with the vertical plane of the spar. The top plane does not require any special preparation before folding, except to fold the trailing portion of the centre section, but the lower plane trailing edge has to be folded up or down in order to clear the fuselage in the folded position. Consequently, portions of the trailing edge have had to be made to hinge up or down, and special L-shaped locking pins of the form shown in Fig. 3 are employed. These are locked in place by "safety pin" wire locking devices.

The undercarriage is of the plain V-type, with rubber cord shock absorbers. Special wheels, with ash rims and double-diagonal mahogany sides, have been built for the machine, and their shape is such as to offer the least possible resistance.

At the moment of writing it is not definitely known what engine will be fitted, but it is hoped to be able to obtain the information in time to include in the table of particulars given on p. 588, to which, therefore, we would refer our readers for information concerning the engine.

The Vickers "Vagabond," as already mentioned, was built at the Avro works at Hamble, and the workmanship is very good, and quite up to the very high standard set by Vickers themselves in the case of the "Viget," which was generally admired for its excellent workmanship.

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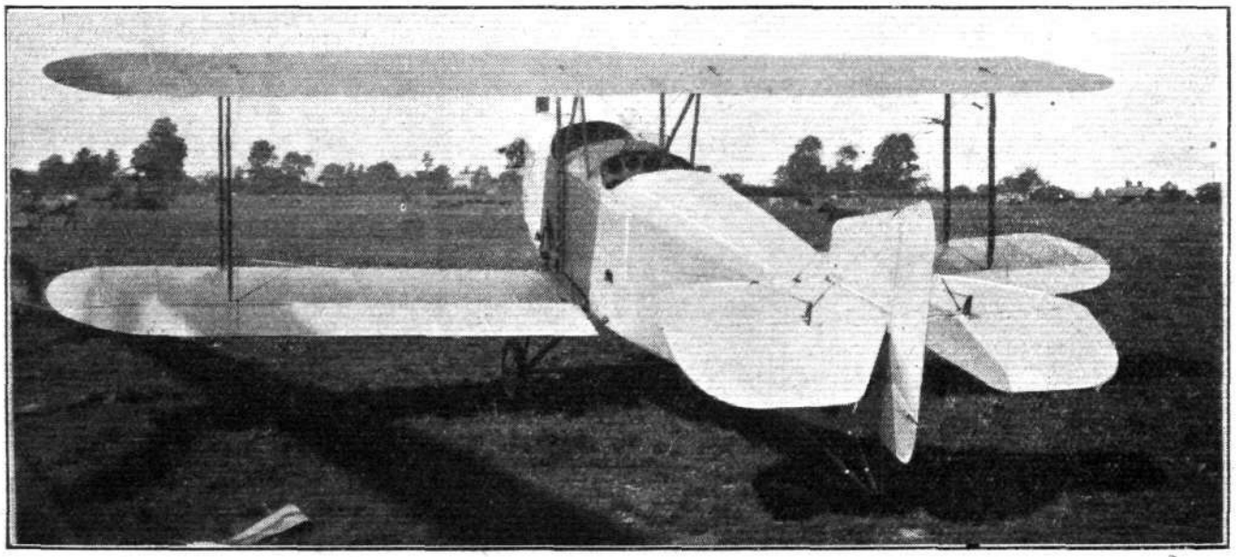
THE WESTLAND "WOOD PIGEON" LIGHT BIPLANE (No. 5)

Bristol "Cherub" Engine

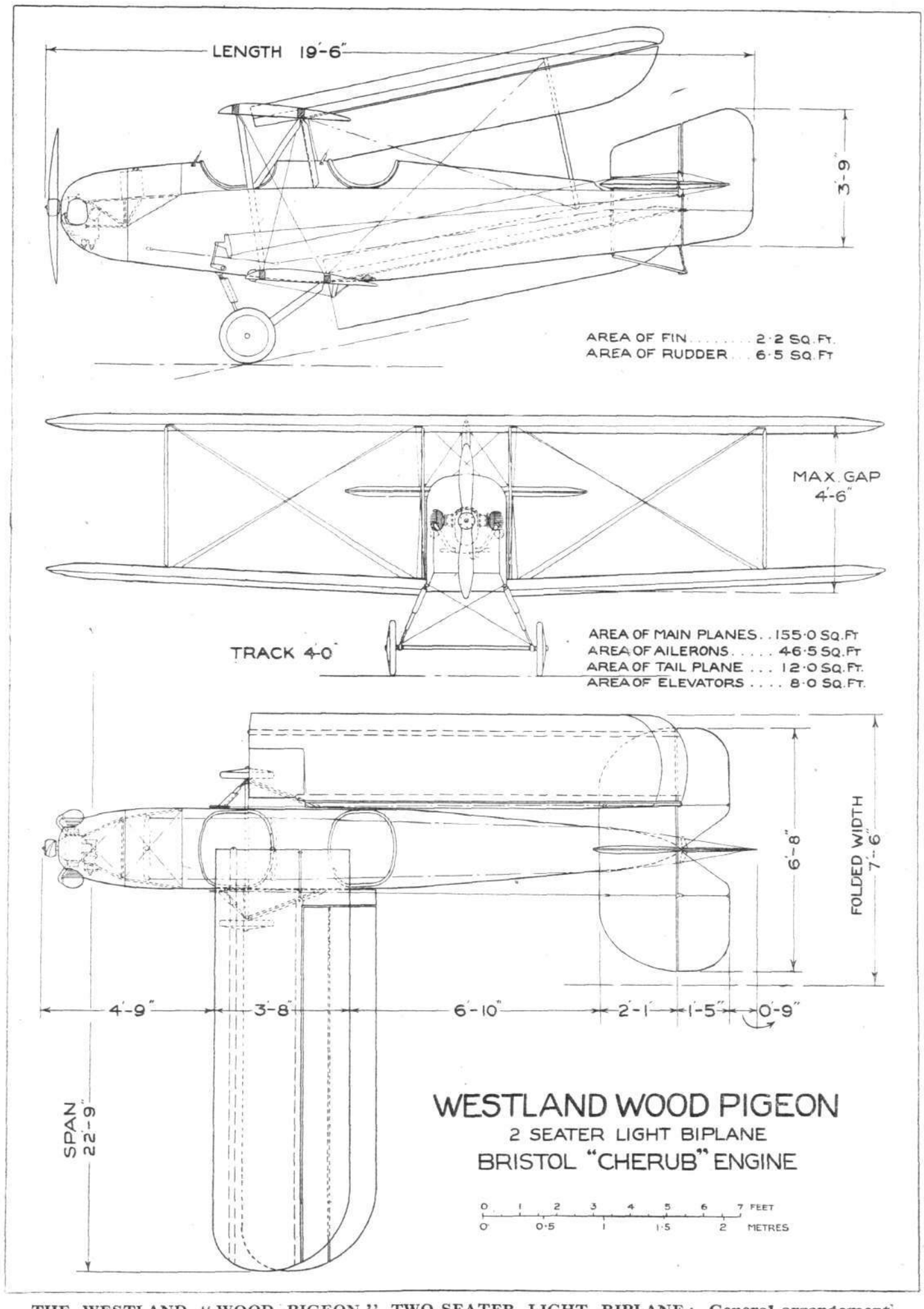
THE "Wood Pigeon" light biplane designed and built by the Westland Aircraft Works of Yeovil for the Lympne competitions is in outward appearance a normal single-bay tractor biplane, but when one comes to look into the detail construction many novel and interesting features are to be found, notably in the system evolved for folding the wings, which is different from any we have seen so far. In addition the biplane wings are provided with wing flap gear which can be used either as a perfectly automatic device or as a mechanically operated variable camber gear—*i.e.*, the movement of the flaps is automatic in normal flying, but should the pilot, for some reason or other, desire to give greater

No. 5, THE WESTLAND "WOOD PIGEON," Bristol "Cherub" engine: Three-quarter front view.

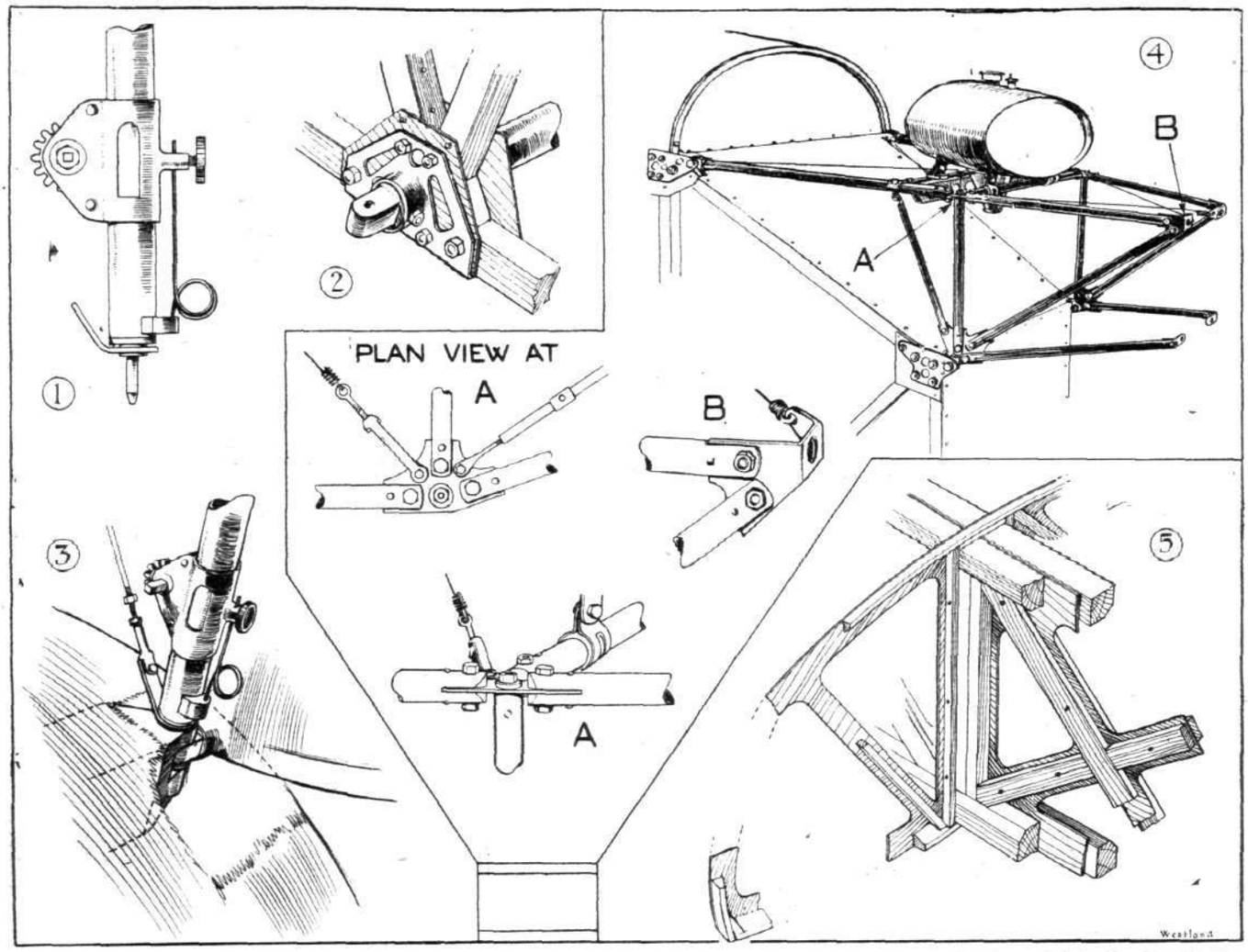


No. 5, THE WESTLAND "WOOD PIGEON": Three-quarter rear view.

FLIGHT
AIRCRAFT ENGINEER AND AIRSHIPS



THE WESTLAND "WOOD PIGEON" TWO-SEATER LIGHT BIPLANE: General arrangement drawings to scale.



SOME WESTLAND CONSTRUCTIONAL DETAILS: 1. Shows the rack and pinion by which the locking pin in the lower end of the front inter-plane strut is brought into engagement with the lug on the fuselage. The pin is withdrawn from the fuselage lug by a turn of the pinion, using a special spanner, and the wing can then be folded. A further turn brings the pin right out of the spar fitting, and the strut can then be removed from the wing. 2 shows the fuselage fitting, and 3 the strut in position with wing spread. 4. Gives details of the tubular engine mounting and its attachment to fuselage. 5. Details are given of the wing construction of the Westland monoplane two-seater. The spars consist of a central three-ply web, with divided flanges and lattice bracing, all of wood.

camber than is automatically provided, he can do so by mechanical hand-operated means. At the moment it is not permissible to describe this device in detail, nor to publish sketches of the mechanism, but the general principle is as outlined above.

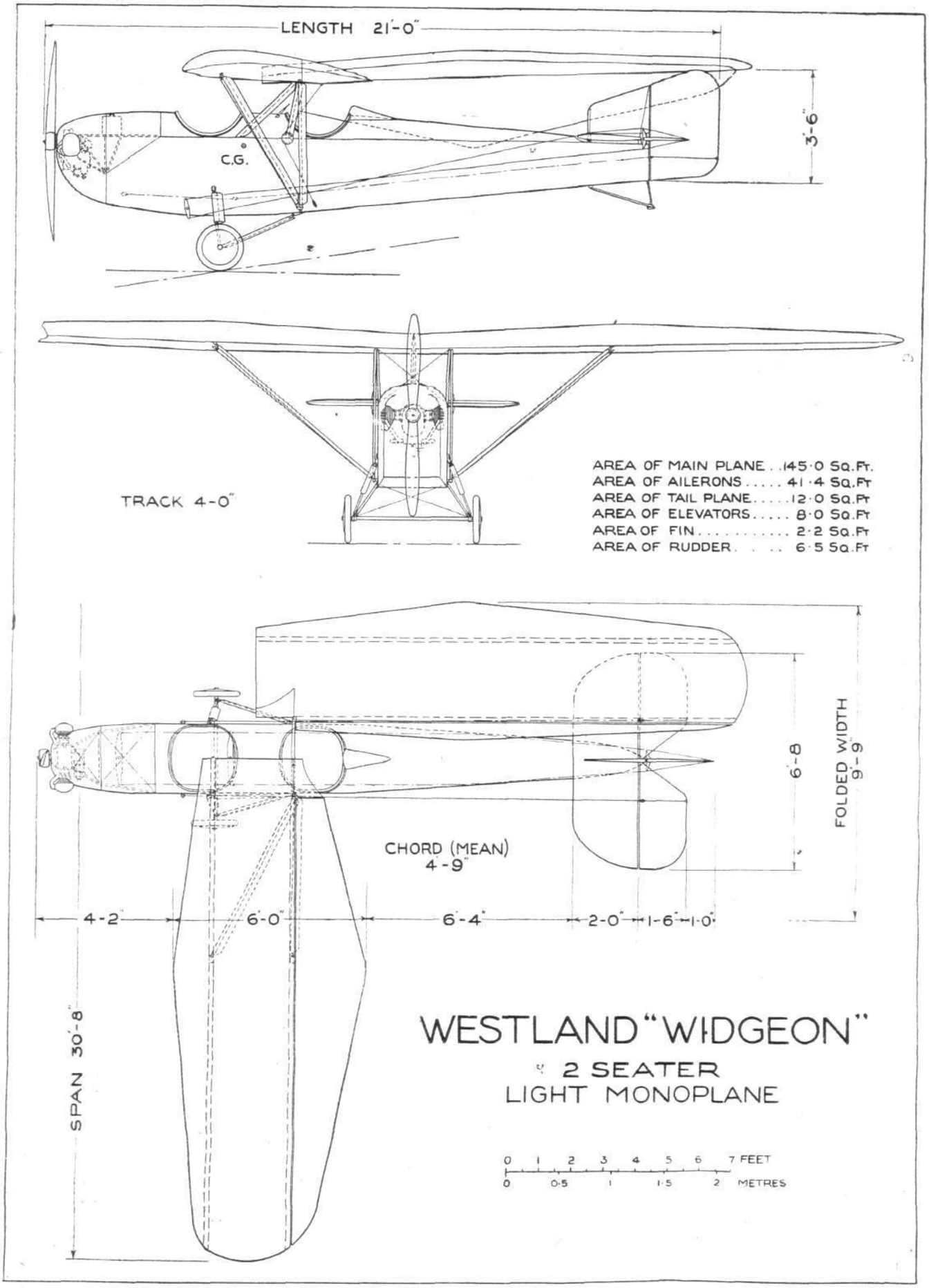
The Westland "Wood Pigeon" is, then, a normal single-bay tractor biplane, with the lower plane set at a dihedral angle, while the top plane is straight. The fuselage is rather unusually deep at the stern post, in order, probably, to make the trailing wing flaps clear the ground when the wings are folded. Otherwise there is nothing remarkable about the external appearance of the machine.

The fuselage is of the usual type, with wire bracing in the rear portion, but triangulated construction in front. The two cockpits are arranged in tandem, and access to both is facilitated partly by the special strutting employed, resulting from the unusual folding arrangement, and partly by having the trailing edge of the inner portion of the top plane (there is no top centre-section, strictly speaking) hinged to fold upwards. The controls are of the orthodox "joy-stick" type, but the elevator is operated by cables from external cranks, as shown in the general arrangement drawings. The camber gear, as already stated, may not be described in detail.

The biplane wings are of normal construction as regards their spars and ribs, but a very unusual attachment to the fuselage is provided. The front spars meet on or rather above the centre line of the fuselage. The rear spars, however, stop short, and are hinged to the equivalent of a top centre-section rear spar, carried on inverted vee struts from the top longerons. These two inverted vees, of steel tubing, are braced laterally by wires across the top of the fuselage. The two front spars, meeting in the centre, are not supported direct from the fuselage, their inner ends being overhung. In place of the usual front struts rising from the top longerons, and supporting the top centre-section front spar, longer struts, running down just outside the fuselage, meet the lower front spar. These struts are, in fact, fitted in the position usually occupied by the "jury struts" used when the wings of a biplane are folded, only in the Westland "Wood Pigeon" they are permanent members of the structure. For folding the wings the trailing edge of the inner end of the top plane is raised, the pin locking the two halves of the front spar together is withdrawn, and the plunger in the lower end of the front struts is raised sufficiently to clear the fitting on the fuselage, when the wings can be folded back. The inner front struts are provided with a special plunger, as shown in Figs. 1, 2 and 3, built into the end of the struts. There are three positions for this plunger. In the first it is right down and engages with the fitting on the fuselage, locking the wing in place in the spread position. In the second it is withdrawn sufficiently to allow of the wing being folded, while in the third, or topmost, position, it is withdrawn into the strut end sufficiently for the strut to be removed from the wing. The upper end of this strut is a plain forked end attached to an eyebolt.

Two types of undercarriage have been developed for the two Westland machines. One is of the oleo-pneumatic type, and is shown in the photograph of the biplane. The other has friction devices incorporated in the telescopic legs. At the moment we are not quite certain which type will be fitted in the competitions.

The Bristol "Cherub" engine is mounted on a steel tube structure, details of which are shown in Fig. 4. The tubes are slotted to receive the plates, etc., and are reinforced at the ends by aluminium filler blocks.



THE WESTLAND "WIDGEON" LIGHT MONOPLANE TWO-SEATER: General arrangement drawings, to scale. The drawings show the machine fitted with Bristol "Cherub" engine, but in the competitions a Blackburne engine will be fitted.

THE WESTLAND "WIDGEON" LIGHT MONOPLANE (No. 6)

Blackburne Radial Engine

THE Westland monoplane, the "Widgeon," is of very unorthodox design compared with the majority of the machines entered for the Lympne competitions, not only as regards its aerodynamic features, but also in the matter of structural design. It is regretted that no photographs of this machine are available, but the general arrangement drawings should give a fairly good idea of the lines, while the unusual wing spar construction is shown by a sketch (Fig. 5.)

The Westland "Widgeon" is a "parasol" monoplane—*i.e.*, with the wing placed well above the fuselage. The view laterally, forward and aft, and downwards should be well-nigh perfect, while even in an upward direction the view is restricted to but a very small extent. This is due to the fact that the monoplane wing tapers considerably in chord towards the root, so that the pilot in the rear cockpit can look up and backward, while the front pilot can look in all directions, except diagonally up and back.

The fuselage structure is almost identical with that of the Westland "Wood Pigeon"—*i.e.*, a normal girder braced by piano wire tightened by turnbuckles. It is flat-sided and flat-bottomed, but with cambered deck. The engine shown in the general arrangement drawings is a Bristol "Cherub," but actually we believe a Blackburne will be fitted.

The monoplane wing is tapered in chord and thickness from the strut attachments to both root and tip. The folding arrangement is very similar to that described in detail for the biplane, except that the two front external struts are taken to the inner end of the lift struts. As in the biplane the ailerons run the whole length of the wing, and they are of unusual plan form in order to continue the aerofoil sections of the tapering wing.

Structurally, the wings are of interest on account of the unusual spar construction. In place of I section or box section spars, those of the Westland "Widgeon" are built up as shown in Fig. 5. The central spar web is of three-ply wood, cut out to form a series of X's. Top and bottom flanges are screwed and glued to each side of this three-ply web, while the three-ply itself is reinforced by diagonal strips, the divided strips on one side coming opposite the solid strip on the opposite side. The sketch will make this point clear

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LIGHT AEROPLANES AND THE COMPETITIONS

THE following direction has been issued by the Secretary of State for Air under Article 26 (1) of the Air Navigation (Consolidation) Order, 1923 :—

"On the recommendation of the Air Ministry, every aircraft entered for the proposed competition known as the 'Two-Seater Light Aeroplane Competition, 1924,' intended to be held by the Royal Aero Club during September and October, 1924, is hereby and subject as hereinafter mentioned, excepted from such of the provisions of the Air Navigation (Consolidation) Order, 1923, as provide that an aircraft shall not fly unless it is registered, possesses the nationality of a contracting State, bears prescribed nationality and registration marks and the name and residence of the owner, and is certified as airworthy, and that an aircraft when flying shall carry its certificate of registration and its certificate of airworthiness.

"This exception is subject to the following limitations and conditions :—

(1) It shall apply only to aircraft in respect of which a "Special Certificate for the purpose of the Two-Seater Light Aeroplane Competition, 1924,' has been granted by the Air Ministry, and shall apply only while such certificate is being carried in the aircraft.

(2) It shall apply only (*a*) to flights carried out in the course of the said competition, including practice flights carried out at the place of the competition before its commencement or during its continuance; and (*b*) to flights for the purpose of proceeding to or returning from the place of the competition. It shall not, however, apply to any flight which takes place wholly or partially over a city or town area or populous district.

(3) If it appears to an authorised representative of the Secretary of State that the flight of any aircraft to which this exception applies is unduly dangerous, such representative may, by notice in writing to the owner, pilot, or person in charge of the aircraft, cancel or suspend this exception as regards that aircraft, and this exception shall thereupon cease to apply to that aircraft unless and until such cancellation or suspension is withdrawn in writing by an authorised representative of the Secretary of State.

(4) Subject to the provisions of the preceding paragraph, this exception shall operate until 10 days after the conclusion or abandonment of the said competition. Provided that this exception may be withdrawn at any time by the Secretary of State." (Air Ministry Notice to Airmen *No.* **85** *of* 1924.)

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THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS

AIR LEAGUE CHALLENGE CUP

THE race for the Air League Challenge Cup will take place on Wednesday, October 1, 1924, at Lympne Aerodrone, Hythe, commencing at 2.30 p.m.

One flight of three Sopwith Snipe aeroplanes from each of the following squadrons will compete :—

No. 25 (Fighter) Squadron, Hawkinge.
No. 32 (Fighter) Squadron, Kenley.
No. 56 (Fighter) Squadron, Biggin Hill.

The course will be 100 miles, and will not be made known to the competitors until 15 minutes before the start.

The winner will be the squadron which completes the course in the fastest time in the best formation.

Judges from the Royal Air Force will be stationed at various points on the course to watch the formation flying.

GROSVENOR CHALLENGE CUP

List of Entries

Entrant.	Pilot.	Aeroplane.	Engine.
Sir G. Stanley White, Bart. ..	—	—	—
Robert Blackburn	—	—	—
Commander James Bird	Capt. H. C. Biard ..	Supermarine "Sparrow"*	Blackburne.
The Rt. Hon. Lord Invernairn ..	—	Beardmore †	Bristol "Cherub."
A. V. Roe	—	Avro "Avis"* ..	Bristol "Cherub" or Blackburne.
Robert A. Bruce	—	Westland "Widgeon"†	Bristol "Cherub" or British Anzani.
P. W. Petter	—	Westland "Wood Pigeon"*	
Sqd.-Ldr. W. Thomas	Flt.-Lt. N. Comper ..	—	—
Douglas Vickers	Sqd.-Ldr. H. J. Payn, ..	Vickers "Viget"* ..	Blackburne.
Douglas Vickers	Flt.-Lt. E. R. C. Scholefield	Vickers "Vagabond"*	Bristol "Cherub" or British Anzani.
Flt.-Lt. A. L. A. Perry-Keene, F.O. L. A. W. Deane, F.O. A. J. R. Moss	Flt.-Lt. A. L. A. Perry-Keene	"Bircham Beetle"† ..	A.B.C.
Philip N. G. Peters	Flt.-Lt. P. W. S. Bulman, M.C., A.F.C.	"The Hurricane"† ..	Bristol "Cherub."
H. O. Short, Rochester	J. L. Parker	Short †	Bristol "Cherub."

* = Biplane. † = Monoplane.

H. E. PERRIN, Secretary.

FLIGHT
THE AIRCRAFT ENGINEER AND AIRSHIP

THE ENGINES USED IN THE COMPETITIONS

IN view of the fact that, although the prizes at Lympne are to be awarded for certain performances of the machines, the real test will largely be one of engine power and engine reliability, inside the limits imposed by the 1,100 c.c. capacity permitted as a maximum, very considerable interest attaches to the engines employed in the various machines, as upon them will depend to a great extent the success of the tests. With the exception of the Bristol "Cherub," which has, as already announced in FLIGHT, passed its Air Ministry airworthiness tests, the engines used are largely of an experimental character, either having been evolved barely in time to be in the machines or having been converted from their original form to suit the special conditions obtaining in light 'plane work. There must, therefore, necessarily be a certain amount of speculation as to how this and that type will stand up to the extremely strenuous conditions of the competitions, and incidentally it would appear that any engine, whether it has already obtained its airworthiness certificate or not, which comes through the trials with flying colours will have demonstrated its suitability, and might, we think, be granted a certificate of some sort, even if the rules and regulations governing airworthiness tests are such as to preclude the Air Ministry from giving it the regulation certificate.

It will be realised from the fact that machines will have to do at least 150 miles at full power in the high-speed tests, probably 300 miles or even 450 miles, and complete not less than 10 hours' flying during the week, not to mention repeated attempts at low-speed, take-off and pull-up, that the engines will by no means be having an easy time of it, and one of the greatest uncertainties, apart always from the question of weather, is how the engines will fare. There may easily be some surprises in store in this connection, and in a way this adds a certain amount of interest to the whole competition.

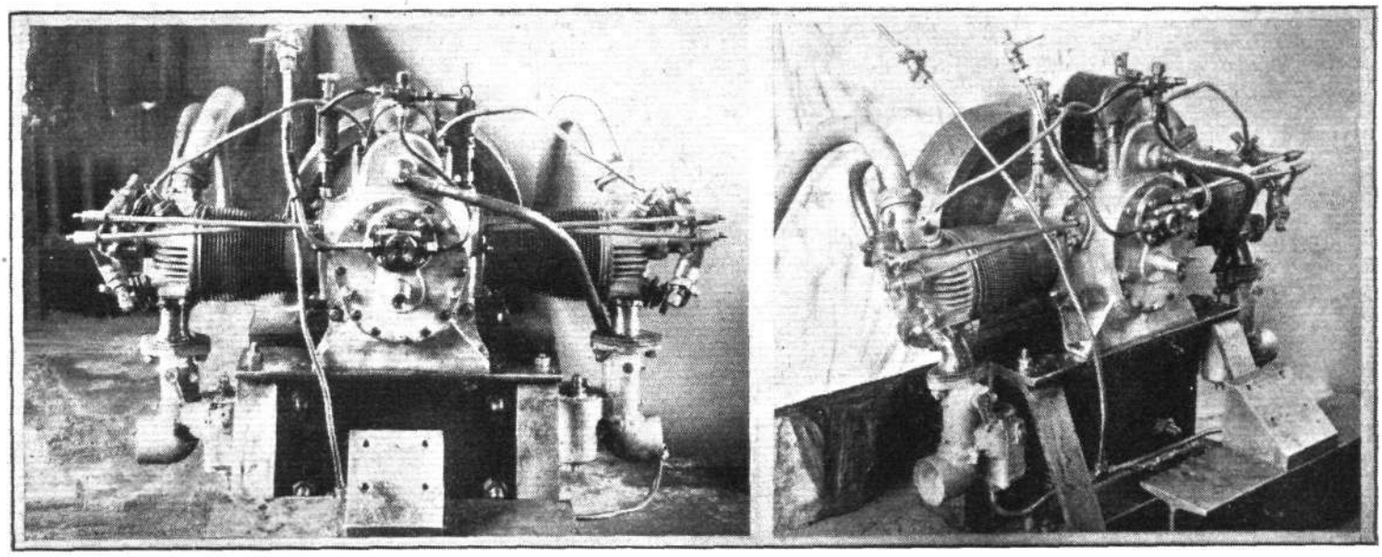
Below we give a brief description of each of the four engines taking part. In the case of two of the engines it has been impossible to obtain from the manufacturers, in spite of repeated applications, particulars of bore, stroke, volume, weight, power output, etc., as well as illustrations, although as regards the latter some idea of the outward appearance of the engines in question may be gathered from the photographs of machines in which the engines are shown *in situ*.

THE A.B.C. "SCORPION"

THE A.B.C. "Scorpion" light 'plane engine is manufactured by A.B.C. Motors of Walton-on-Thames, and is a modification of the A.B.C. car engine. It is of the flat twin type, air-cooled, and with a bore and stroke of 87·5 mm. by 91·5 mm. respectively. The aluminium crank-case is divided laterally, a spigoted joint being used. The two-throw crankshaft runs in ball bearings at the back and in roller bearings at the front. A short camshaft runs in one plain bearing and one ball bearing, and operates the overhead valves by push-rods and rockers.

The cylinders have detachable heads containing the overhead valves and valve gear, and the heads are generously ribbed to provide good cooling. Owing to the fact that the cylinder heads are perfectly symmetrical, it has been possible to convert the "Scorpion" for aircraft work by merely crossing-over the push-rods, the inlet valves becoming exhaust valves and *vice versa*. It should be realised that the whole engine has been reversed compared with its position in a car—*i.e.*, the side which was front in the car becomes the back in the aeroplane, and the propeller is mounted where, in the car engine, the flywheel is. For aeroplane work, of course, no flywheel is fitted, although one is shown in the photographs. These, however, were taken on the test bench, and show the first converted engine while it was still run with the flywheel in place.

The A.B.C. "Scorpion" develops about 30 b.h.p. at a speed of 3,000 r.p.m. and weighs about 93 lbs. The compression ratio is 5 to 1.



TWO VIEWS OF THE A.B.C. "SCORPION": These photographs were taken while the first engine was being tested, and shows it with flywheel in place of the propeller fitted when the engine is used for aeroplane work. The induction pipes have also been rearranged.

THE BRITISH ANZANI

CONCERNING the special 1,100 c.c. engine developed by the British Anzani Engine Co. of Scrubb's Lane, Willesden, we have been unable to obtain any information whatever. In spite of repeated applications to the makers neither photographs nor particulars have been forthcoming, and we are, therefore, unable to do more than give a very brief account of the features of this engine, which we have seen fitted in several of the machines.

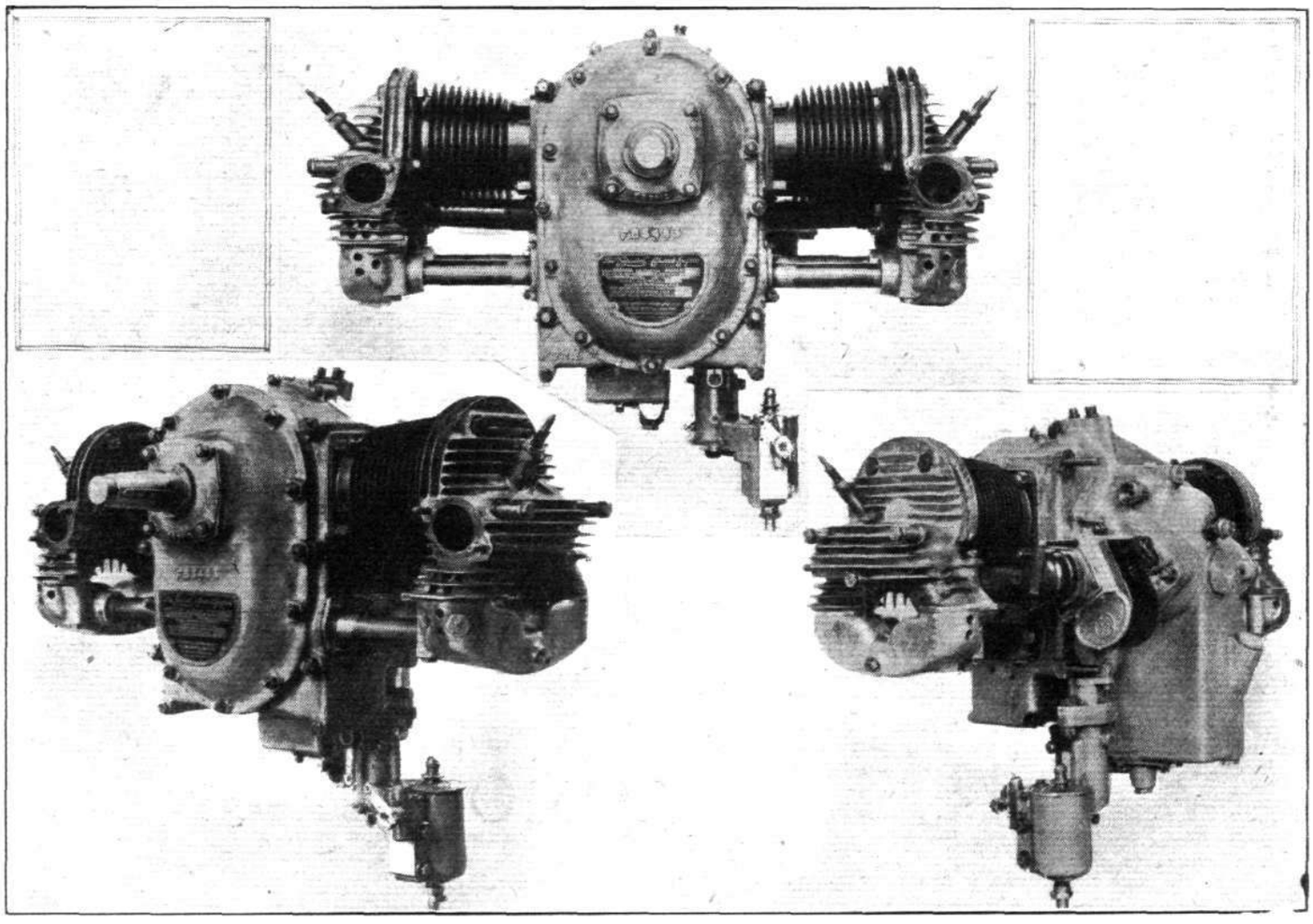
The British Anzani engine is of the motor-cycle type—*i.e.*, it is a vee-twin air-cooled engine, with overhead valves operated by push-rods and rockers. There are four valves to each cylinder, two inlets and two exhausts, so that the engine should prove very efficient and should be capable of a considerable power output. In one or two of the machines in which it is used, it has been mounted "upside-down," the reason for this mounting being that a better view is obtained over the nose of the machine, while gravity feed to the carburettor is facilitated. The short induction pipes on the Anzani are doubtless designed for efficiency, but they necessitate a very high carburettor position. When the engine is reversed the carburettor is brought down a considerable distance, and sufficient "head" is obtained.

THE BLACKBURNE RADIAL

THE Blackburne is another engine about which we have failed to obtain from the makers any information or illustrations. It is designed and built by Burney and Blackburne of Bookham, Surrey, and is of the three-cylinder radial, or "Y" type. The crankcase is approximately spherical, and is of large dimensions. So much so that the three cylinders look rather absurdly small on it. We believe, although we are open to correction, that one reason for this is that the crankcase and crankshaft were designed large enough for a 1,500-c.c. engine, so that after the competitions, when it is expected that somewhat larger engines may be required, the substitution of larger cylinders and pistons is the only change necessary to provide a 1,500-c.c. engine. The oil tank or sump is cast integral with the crankcase, and is heavily ribbed for cooling purposes. This sump may be seen in some of our photographs of machines fitted with the Blackburne engine. It is hoped to be possible to publish a detailed description of the engine in a forthcoming issue of FLIGHT. The Blackburne is said to develop a maximum of 38 b.h.p. at 3,800 r.p.m., which, if correct, seems to make it the most powerful engine in the competitions. This speed, however, is somewhat high for direct drive.

THE BRISTOL "CHERUB"

THE Bristol "Cherub," designed by Mr. Roy Fedden, and built by the Bristol Aeroplane Company, Ltd., of Filton, Bristol, is a flat twin air-cooled engine, having a bore of 85 mm. and a stroke of 96·5 mm. This engine, as already recorded, has passed its Air Ministry type tests, and may therefore be fitted in a light 'plane for which an airworthiness certificate is issued. It is not a converted type, but has been designed from the first for aircraft work, and the most modern aero engine practice has been used in its design. The overhead valves are operated not by push-rods and rockers, but by shafts which rock or oscillate inside their enclosing tubes. The cams on the camshaft operate fingers, which, in turn, operate the rocking shafts. The latter are returned by coil springs, and the mechanism is such that when the cylinders warm up and expand there is no increased clearance between the rocking shafts and the valves.



THE BRISTOL "CHERUB": Front, three-quarter front, and three-quarter rear views. Note the low carburettor position which facilitates gravity feed.

The cylinders of the Bristol "Cherub" have detachable heads of aluminium alloy, and great attention has been paid to the ribbing and general lay-out of the heads to ensure even and adequate cooling. The camshaft is mounted below the crankshaft, so that the lubrication of cams and fingers is thoroughly carried out. The big-ends of the connecting rods are threaded over the crank webs and secured in place by special washers. Very particular care has been bestowed on all details, and particularly on the design of the big-ends and bearings, and at the speeds for which the airworthiness certificate has been granted there is little fear of anything giving out. As a matter of fact, the engine could probably safely be run at considerably higher speeds, but the present maximum permissible speed is 3,200 r.p.m., at which the engine develops 32·6 b.h.p.

Inspection of internal parts, and general overhauls, are facilitated by the design of the engine. Thus, by removing the front cover plate one can get at the internal mechanism, crankshaft, big-ends, camshaft, etc., while the cylinders themselves are readily detachable, as are also the cylinder heads.

The workmanship is, it goes without saying, of the very highest order, as are also the materials put into the engine. The fact that the "Cherub" has passed its type tests is, in itself, sufficient guarantee for that. The weight of the engine is 81 lbs., and the petrol consumption is 0·625 pt./h.p./hour. A geared type of "Cherub" is in course of development.

FLIGHT
THE AIRCRAFT ENGINEER AND AIRSHIPS

3,000 MILES IN 55 HOURS

Another Fine Flight by Alan Cobham

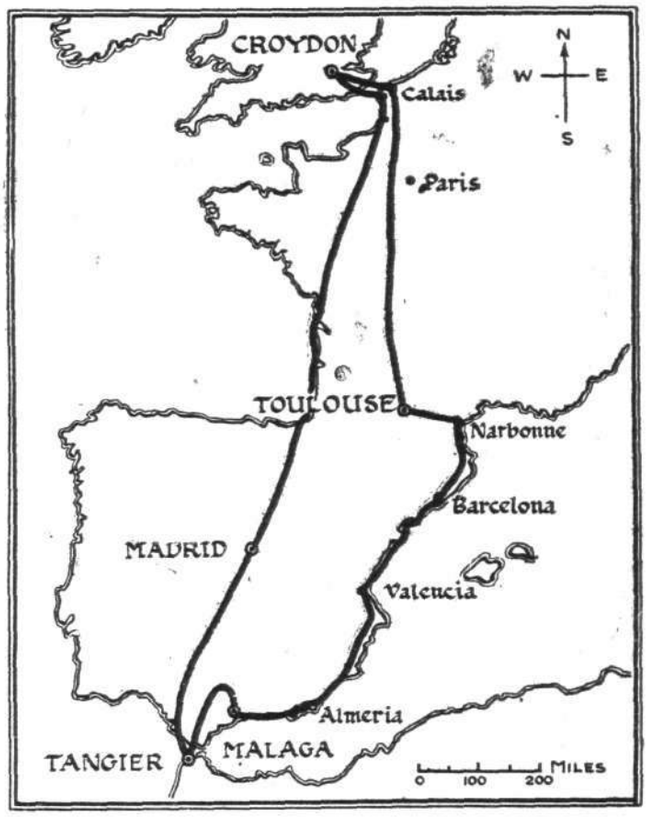
ONCE again Alan Cobham, the "Air Taxi Pilot," has made one of his now famous long-distance air dashes to foreign parts. In so doing he has not only accomplished a really remarkable flight, but he has demonstrated—as indeed he has always done by these long flights of his—the true practical value of the aeroplane as a means of speedy transport. In this latest venture he has covered a distance of 3,000 miles in 55 hours, and without any previous preparations or special arrangements *en route*.

In short, leaving Croydon at 6 a.m. on Friday last, on a D.H. 50 biplane fitted with a Siddeley "Puma" engine, he made a non-stop flight to Madrid, and after half an hour here for re-fuelling continued on to Tangier, arriving at 7.25 p.m. He thus covered a distance of 1,300 miles in 13 hours' flying time. At 7.20 a.m. the following morning Cobham left Tangier for Croydon, and after stopping at Malaga, flew on to Toulouse, where he arrived at 6 p.m.—or 1,050 miles in 8 hours 45 mins.' flying time. The rest of the journey home, *via* Calais, was made non-stop the next day, Sunday, when the 650 miles was accomplished in 6 hours 20 mins.

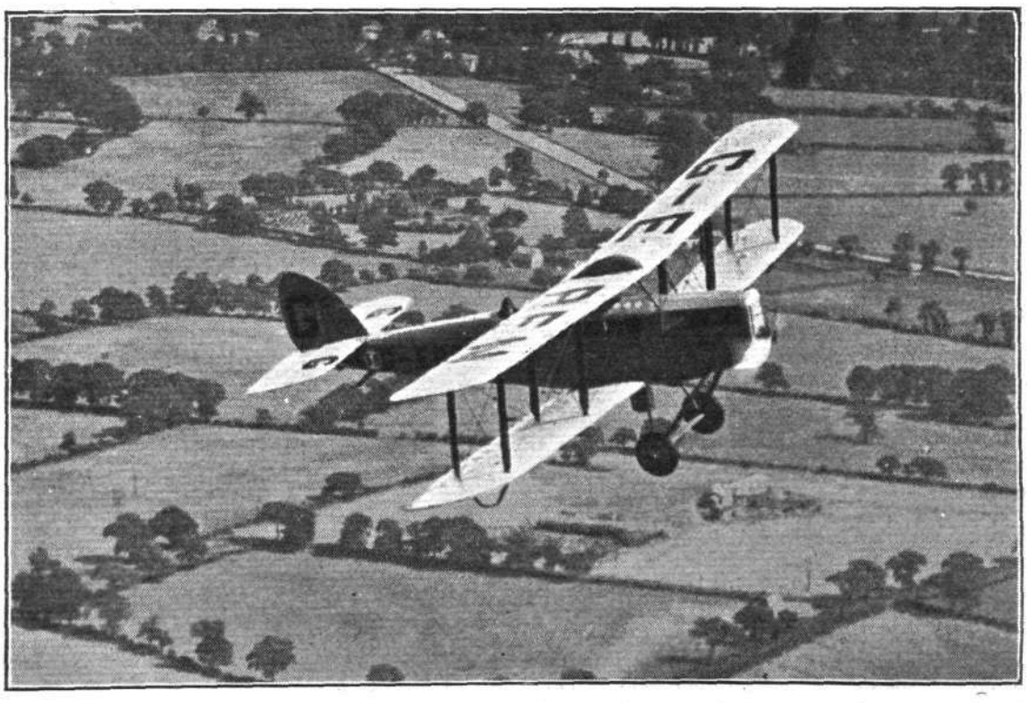
The details of the flight are as follows. It was still dark when Cobham, accompanied by a mechanic, left Croydon on D.H. 50 G-EBFP—which, by the way, had the same Siddeley "Puma," supplied by the Aircraft Disposal Co., which was used in the winning machine in the last King's Cup race, and which has not been altered or overhauled since that event. It may be mentioned, also, that this engine is fitted with a Watford magneto and a Claudel carburettor, while the plugs used were K.L.G. Immediately after leaving, the Tatsfield air lighthouse was picked up, and then shortly after the Littlestone air lighthouse. The Channel was crossed just as dawn was breaking, passing over from Dungeness to Boulogne. A compass course was then set on a route direct across the whole of France *via* Cape Ferret (near Bordeaux). When over Brittany a heavy local fog bank was encountered, but Cobham flew safely over this.

Shortly after the River Gironde came into view, and as he was now about half-way to Madrid Cobham began to calculate on the possibility of reaching Madrid on the fuel left—the tank on this occasion had a capacity of 145 gals, and, of course "Shell" petrol and oil were used. He also made a rapid calculation as regards time, for it was essential that he should reach Africa before dark, and there was not over much time to spare in which to accomplish this.

From the Gironde he flew along that extraordinarily straight bit of coast line to Biarritz—a dead straight stretch of sandy beach, with dense forest running almost to the water's edge, about 160 miles long. As there was a strong head-wind against him he flew along this portion at an altitude of about 50 ft. in order to get as much shelter as possible. Just before reaching Biarritz he steered across the Bay of San Sebastian, and as the Pyrenees were looming up he com-



menced to climb steadily up to between 3,000 to 4,000 ft. in order to cross them. Then, setting a compass course straight for Madrid he flew over the mountainous border into Spain. Although it is easy to recognise this part of the country as Spain—all gigantic "rocks" and brown earth—it is not easy to find land-marks to steer by.



The D.H.50 biplane, 230 h.p. Siddeley "Puma": It was on a similar machine to this, G-EBFP, that Alan Cobham made his splendid flight to Tangier and back described above.

After crossing the Guadarrama Mountains, however, Cobham was able to fly most of the way to Madrid by the aid of various landmarks he knew well. Arriving at the Quatro Ventos aerodrome at Madrid at 3.10 p.m., he at once set about refuelling, and a scene of extreme hustle and bustle it was, for the remainder of the journey was going to be a race with the sun. It was exceptionally hot here, especially after the cool conditions in England and in the air. By 3.40 p.m. all was ready, and Cobham set out for Tangier. On this section he had to rely entirely on the compass until Seville, after which he flew over known country, *via* Jerez de la Frontera and Cape Trafalgar. When crossing the Straits of Gibraltar the coast of Africa was sighted out of the mist when about half-way.

He landed at Tangier at 7.25 p.m., and as he did so the sun went down! He was met by the British Consul and many others, who warmly congratulated him on his splendid effort. Incidentally, it may be mentioned that in addition to copies of London newspapers, Cobham carried and delivered messages from Air Vice-Marshal Sir Sefton Brancker to the Governor of Gibraltar and the Ambassador at Madrid.

The following morning, at 7.20 a.m., he started on the homeward journey. Passing over Gibraltar, he steered inland, but had not gone far when low clouds over the mountains decided him to alter his course for the east coast of Spain, so he turned towards Malaga, where he landed at 8.50 a.m. He started off again at 10.45 a.m. and flew along the coast *via* Almeria, Alicante, Valencia, Barcelona and Narbonne, to Toulouse, where he landed at 6 p.m. He stayed overnight at Toulouse, and left again on Sunday morning at 6.30 a.m. and made a direct-compass course across France to Calais, encountering rain and low cloud *en route*. After a more or less uneventful journey, he arrived back at Croydon at 12.50 p.m., having thus completed the 3,000 miles in 55 hours. His actual flying time for the whole trip was 28 hours, and the average speed 107 m.p.h.

ROUND-THE-WORLD FLIGHTS

ALTHOUGH, officially, the American World-Flight ends when the airmen reach Seattle, it is probable that by the time these lines appear in print it will have been brought to a successful conclusion, for the latest news to hand is that Lieut. Lowell-Smith with Lieut. L. P. Arnold, Lieut. Erik Nelson with Lieut. Harding, and Lieut. Leigh Wade with Serg. Ogden, left San Diego on Tuesday afternoon for Santa Monica, the original starting point.

After their arrival at Chicago on September 15, the American World-Flyers spent the following day in that city, when no doubt they had to undergo a great deal of the usual "functioning." On September 17, however, they set forth once more, leaving Chicago at 9.11 a.m. for Omaha, a distance of 440 miles. They arrived at Omaha at 12.44 p.m., having thus taken 3 hrs. 33 mins. for the journey, which was made under ideal conditions.

Starting off again the next morning they flew from Omaha to St. Joseph, Missouri, covering the distance of 100 miles in 1 hr. 40 mins. After a stop here for lunch they flew another 340 miles further on to Muskogee, Oklahoma, taking 3 hrs. 55 mins. for the trip. After this reports to hand are somewhat vague until Sunday, September 21, when it was reported that they had reached El Paso, Texas, and left this city for Tucson, Arizona, about 300 miles distant, where they arrived safely.

The next morning they left Tucson for San Diego, on the Pacific coast, a distance of about 375 miles. The American World Flyers were now but 120 miles from Santa Monica, where they started on the World Flight on March 17 last. Up to this point, therefore, they had flown some 25,000 miles in 91 days.

On September 19, Squadron-Leader MacLaren, Flying Officer Plenderleith and Sergeant Andrews, who made such a splendid effort at a flight round the world, having flown about 12,500 miles before they came to grief at Kamchatka, arrived back in England. Only a few friends met them at Euston, Mrs. MacLaren having journeyed to Liverpool earlier in the day to meet the Canadian Pacific Liner *Montclare*, which brought them from Canada. Interviewed by a representative of the *Times* on his attempt, Squad.-Ldr. MacLaren stated :—

"The effort was on my part a joy-ride pure and simple, and should be regarded in no other way. It was begun just as one might take a motor ride, and from my standpoint as a flying officer was just a ''busman's holiday.' I had no help from the Government. The thing was unofficial in every way. It was my idea of a holiday, and I would have taken Mrs. MacLaren with me if it had not been for the fact that it was attempting something slightly more dangerous than the normal in some respects. With the Vickers-Napier Vulture amphibian I have no fault to find. The machines I used flew magnificently all the time except for the first two breakdowns, and I would choose another Vickers Vulture machine without question if I was going to attempt the thing again."

After a long interval of silence news has just come to hand that Maj. Zani, the Argentine airman, who is attempting a flight round the world on a Fokker biplane (Napier "Lion"), and who crashed at Hanoi on August 18, has at last obtained a new machine, and left Haiphong on Monday and arrived at Hong Kong. Owing to the trouble now prevailing in China further progress is at the moment somewhat doubtful.

AIR TRANSPORT

AT the Institute of Transport held at Wembley on Friday last, September 19, Air Vice-Marshal Sir Sefton Brancker dealt at some length on the question of aerial transport. Reviewing the position of air transport, Sir Sefton said that the rapidity and efficiency of Imperial communications might well be the measure of our success or failure to hold the Empire together in the future. After waiting many years the Government had, he said, at last decided to develop the airship as a commercial vehicle. Two big ships, of 5,000,000 cub. ft. capacity, had been ordered, which would provide accommodation for 100 passengers and would accomplish the flight from England to India, with one stop for fuel, in 100 hours. It might be two years before a regular bi-weekly service to India could be established, but in the meantime the Government would prepare the necessary air ports and carry out experiments on the route with "R.33."

Personally, Sir Sefton said he had little fear for the eventual success of this enterprise, and he believed airships would be of extraordinary Imperial value in the future.

Referring to heavier-than-air machines, he stated that at the end of five years' experience of aeroplane services it could be claimed that great progress had been made. Heavier-than-air machines had flown for 1,500 hours in a year without overhaul, and this flying life should be increased in the near future to 2,000 hours, which would represent flights of 200,000 miles. Absolute regularity could be attained with aeroplane services as long as fair visibility prevailed. Tests were now being carried out, he said, with the heavy oil engine for aircraft which, if successful, would reduce the cost of air transport from shillings to pence.

Various new projects were beginning to receive attention, and among the new services he predicted were :—

Singapore to Australia *via* Dutch East Indies; British East Africa to the Mediterranean; British West Indies and Guiana; Calcutta to Rangoon; British bi-weekly service to India and Australia, the through journey in 11 days; British weekly service to the Cape by way of West Africa in 5½ days; regular Atlantic airship lines; Canada to England in 2½ days; aeroplane and flying boats between British East Africa and Egypt, saving 14 days in trip to London; flying-boat services throughout West Indies and Guiana, saving weeks in mail delivery.

The "ZR 3"

THE flight of the "ZR 3" to America, which was to have been made next month, has been postponed, probably until December, owing to certain technical difficulties. Further long-distance trips will, however, be continued.

Aerial Survey in Canada

A CANADIAN seaplane has just completed an inventory of 20,000 square miles of timber limits in the north-eastern section of Quebec Province, within a period of two months Under older methods, the work would have occupied years

FLIGHT

THE ROYAL AIR FORCE

London Gazette, September 16, 1924

General Duties Branch

Flying Offr. A. P. Davidson (Lieut., High. L.I.) is granted a permanent commn. in the rank stated (Sept. 17).

The following officers are transferred to the Reserve :—

Class A.—Flight Lieutenants—D. F. Lucking, L. R. L. Brown, D.F.C. (September 12). *Flying officers*—H. C. McDonald (September 12) ; S. H. H. Swanton (September 11).

Class B.—Flight Lieutenant.—L. F. P. Bawn (September 16).

Class C.—Flight Lieutenant.—C. Fenn (September 12).

The following Flying Officers resign their short service commns. :—L. H. W. Axtell (Capt., Indian Army, retd.). H. G. Radcliffe (Lieut., Indian Army retd.) (Sept. 17).

Flying Officer R. H. Wathes (Lieut., Sherwood Foresters) relinquishes his temp. commn. on return to Army duty (Sept. 6).

Flying Officer (Hon. Flight Lieut.) G. C. L. Dalley (Lieut. R.N.) relinquishes his temp. commn. on return to Naval duty (Sept. 6).

Medical Branch

Flying Officer E. D. Gray, M.A., M.B., is transferred to the Reserve, Class D2 (Sept. 11).

Princess Mary's Royal Air Force Nursing Service

The following ladies resign their appointments :—Staff Nurse Miss D. Blomfield (May 31) ; Staff Nurse Miss D. J. E. Liddle (July 31).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Wing Commander P. K. Wise, C.M.G., D.S.O., to Station Headquarters, Kenley, to command. 22.9.24.

Squadron Leaders.—T. V. Lister, to R.A.F. Base, Leuchars. 10.9.24. F. G. D. Hards, D.S.C., D.F.C., to R.A.F. Depot (non-effective Pool) on transfer to Home Establishment. 22.8.24. P. B. Hunter to H.Q., Palestine Command ; 28.8.24.

Flight Lieutenants.—J. W. Woodhouse, D.S.O., M.C., to No. 32 Squadron, Kenley. 8.9.24. E. J. D. Routh, to R.A.F. Depot (Non-effective Pool), on transfer to Home Establishment. 22.8.24. R. B. Sutherland, D.F.C., to No. 111 Squadron, Duxford. 8.9.24. A. G. Bishop, A.F.C., and W. A. Duncan to No. 1 Wing Headquarters, India. 12.9.24. W. Elliot, D.F.C., to R.A.F. Depot, Uxbridge, on transfer to Home Estab. ; 1.9.24.

Flying Officers.—L. J. Booth, to Electrical and Wireless School, Flowerdown. 10.9.24. A. E. Connolly, to No. 84 Squadron, Iraq. 5.9.24. G. R. C. Spencer, to Aircraft Park, India. 12.9.24. S. P. George, to No. 5 Squadron, India. 12.9.24. F. G. S. Mitchell, to No. 27 Squadron, India. 12.9.24. C. B. R. Pelly, to No. 60 Squadron, India. 12.9.24. T. D. Berridge, to No. 28 Squadron, India. 12.9.24.

Flying Officers : J. Evason to Royal Airship Works, Cardington ; 1.10.24. L. K. Barnes to No. 440 Flight, Malta ; 5.9.24. G. E. Nicholetts to No. 402, Flight, Malta ; 5.9.24.

Pilot Officers.—H. C. E. C. P. Dalrymple, to No. 5 Flying Training School Sealand. 15.9.24. F. Boston, to No. 5 Squadron, India. 12.9.24. A. S. Lewis, to No. 28 Squadron, India. 12.9.24. E. C. Dearth to remain at No. 5 Flying Training School, Sealand, and not to No. 9 Sqdn., as previously notified.

Stores Branch

Flying Officer (Stores).—R. Lamb, to No. 1 Wing Headquarters, India. 12.9.24.

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AIR LEAGUE CHALLENGE CUP

No. 25 (Fighter) Squadron. Hawkinge, near Folkestone

No. 25 Squadron was formed at Montrose in the summer of 1915 at a time when the advent of the Fokker with a gun which could fire through the propeller had given the Germans something like a superiority in the air. The new squadron was equipped with F.E.2 B. machines, at that time most formidable fighters, and when No. 25 arrived in France in February, 1916, the only squadron already there which had similar machines was No. 20. The first O.C. of the squadron was Maj. F. V. Holt, D.S.O.

The squadron was stationed at Auchel, and took a vehement part in the air fighting, and by its prowess was largely responsible for the rapid recovery of the master-hand in the air by the British which took place at that time. During the Somme battles Lieut. McCubbin and Corporal Waller, in an F.E.2.B., shot down the famous German pilot, Immelman, whose name will live probably for ever in the manœuvre which he is said to have invented. Another incident was the raid on the railway station of Libercourt on September 25, 1916, when two troop trains were wrecked by bombs and all the station buildings thoroughly bombed and shot up. In June, 1917, the 25th squadron was re-equipped with D.H.4's and moved later to Boisdinghem to join the 9th Wing, R.F.C., where it continued to do good work as a bombing squadron. The present Squadron-Leader is A. H. Peck, D.S.O., M.C., and the squadron at present boasts in addition one D.S.O., one M.C., three D.F.C.'s, and one M.B.E. Its official machine now is the Grebe, but it can still raise three Snipes to compete for the Air League Cup.

No. 56 (Fighter) Squadron. Biggin Hill, Kent, near Bromley

No. 56 Squadron has a very famous past, for Albert Ball was one of its pilots, but at the moment the greatest point of interest about it is that it is commanded by Squadron-Leader Sir Christopher J. Q. Brand, K.B.E., D.S.O., M.C., D.F.C., who accompanied Sir Hesperus Van Rynefeld on his historic flight across Africa to Capetown (to say nothing of the preliminary journey across Europe and the crossing of the Mediterranean by night). Sir Christopher was born in 1893 at Beaconsfield, Cape Colony, and in 1915 he joined the Witwatersrand Rifles. Next year he was appointed to the R.F.C., and by the end of the War had reached the rank of temporary Major. The D.S.O. and D.F.C. were both conferred upon him for very gallant fights by night with enemy aircraft in France. When he set the first on fire he was so close that the flames scorched his face, and on the second occasion he put a bullet through the German's oil sump and was himself nearly blinded by the escaping oil. He followed the enemy down until fire from the ground grew so heavy that he had to leave him, but the latter is believed to have crashed.

The 56th Squadron was formed at Gosport in June, 1916, from the 28th Home Defence Squadron. Its first commander was Maj. R. J. Blomfield, and its equipment consisted of S.E.5's. They went to France in April, 1917, Capt. Ball being one of the pilots. He was killed in the first week of May, having accounted for 38 enemy aeroplanes and one balloon. The Victoria Cross was granted to him after his death. After the daylight raid on London on June 13, 1917, the 56th Squadron was brought back to England, but returned to France in less than a month. Two days later the Germans again raided London in daylight.

Capt. J. B. McCudden, V.C., was also in this squadron, but was flying over to take command of another when he was killed in a crash. In addition to two Victoria Crosses, the squadron won five D.S.O.'s and one bar, 17 M.C.'s and seven bars and one second bar, 12 D.F.C.'s and one bar.

No. 32 (Fighter) Squadron. Kenley, Surrey

This squadron was formed in January, 1916, from the remnants of No. 21 Squadron which was going to France. The first commanding officer was Maj. L. W. B. Rees, afterwards V.C. At first they had only two Vickers fighters and some Henri Farmans, but were gradually re-equipped with D.H.2's. In May of the same year the squadron went to France, and during its time there was moved frequently from place to place. On July 1, 1916, Maj. Rees won his Victoria Cross by attacking 10 enemy aeroplanes. He was wounded in the fight, and was succeeded by Maj. T. A. E. Cairns. In May, 1917, the squadron received D.H.5 aeroplanes, and in March, 1918, the equipment was again changed to S.E.5.A's. It has Snipes at present, but its time for another re-equipment is not, it is to be hoped, far off. The squadron was disbanded in December, 1919, but was reformed at Kenley in April, 1923. The C.O. is Squadron-Leader H. P. Lale, D.S.O., D.F.C.

This squadron has recently given a great amount of pleasure to visitors at Wembley by the part it took in the torchlight tattoo, and everyone rejoices that Pilot Officer B. D. J. Broadway escaped when his machine caught fire after a forced landing in the dark.

British Schneider Cup Seaplane Lost

THE one and only British entrant for the Schneider Cup Race, which takes place at Baltimore, U.S.A., next month, has, we regret to say, been lost in an accident, and our chances of regaining the Cup this year are out of the question. On Friday evening last the special seaplane built by the Gloucestershire Aircraft Co. was put through its first trials at Felixstowe, and it was at the close of the test that the disaster occurred—fortunately without hurt to Mr. H. S. Broad, the pilot. The performance of the machine in the air, it is stated, was very promising, but at the conclusion of the flight Broad brought the machine down on to the water in the harbour and, according to reports, landed beautifully. It had no sooner alighted, however, when apparently the undercarriage or floats gave way and the machine began to sink. A fast motor-boat at once put out from the R.A.F. Station and effected an exciting rescue of Broad, the pilot. A few moments later the machine sank, and so far all efforts to salve it have failed. This machine, which was fitted with a special Napier "Lion" engine, was built to the order of the Air Ministry as an experimental high-speed performance craft, and it was intended should its performance prove satisfactory, to loan the machine to the Gloucestershire Aircraft Co. for participation in the Schneider Cup Race.

The Tour de France Competition

THE aerial Tour de France Competition, promoted by the Aero Club de France, which started on September 7, was concluded on September 17. Extending over a period of 11 days, the competitors had to cover a distance of 2,120 km. (1,318 miles), the course being divided into 18 stages as follows: September 7, Paris (Orly)-Orleans, Orleans-Bourges. September 8, Bourges-Tours, Tours-Angers. September 9, Angers-Chateauroux, Chateauroux-Clermont Ferrand. September 10, Clermont Ferrand-Lyons. September 11, rest at Lyons. September 12, Lyons-Chalon-sur-Saône, Chalon-Dijon. September 13, Dijon-Luxeuil Luxeuil-Strasburg. September 14, Strasbourg-Nancy, Nancy-Metz. September 15, Metz-Charleville, Charleville-Valenciennes. September 16, Valenciennes-St. Inglevert. September 17, St. Inglevert-Amiens, Amiens-Paris, Le Bourget. There were 21 entries for this competition, of which 16 started. Of the 16 starters, 15 completed the course, and 11 of these did so without losing any marks. The machines were placed in different categories according to the horse-power per passenger carried, and the leading machines in each category at the conclusion of the competition were as follows: 20-30 h.p./pass., Potez VIII (50 h.p. Anzani), Favreau-Labouchère. 30 40 h.p./pass., Morane (120 h.p. Salmson), Fronval. 50-70 h.p./pass., Nieuport-Delage (180 h.p. Hispano-Suiza), Lasne. 70 and over h.p./pass., Schreck Amphibian (180-h.p. Hispano-Suiza), Paumier.

Air Minister's Middle East Tour

LORD THOMSON, the Minister for Air, who left London on Wednesday of last week for a tour of inspection of the Royal Air Force units in the Middle East and Iraq, arrived at Alexandria on Monday. From here he will proceed to Iraq by air. The return journey will be made by desert route from French Syria, calling at Damascus.

"All the World's Aircraft"

IN the fourteenth issue of "All the World's Aircraft" for 1924, just out, compiled and edited by C. G. Grey and published at £2 2s. by Messrs. Sampson Low, Marston and Co., Ltd., 100, Southwark Street, London, we find a really interesting and useful reference book dealing with the all-important subject of aviation. This present edition appears in an entirely new form, and is, we think, a vast improvement on previous issues. The most important change is in the size and shape—the new volume being slightly smaller as regards overall dimensions, and its aspect ratio is nothing like so high as it was, which makes for easier control.

The contents are divided into four sections:—Part A, The World's Aeronautical Progress. Part B, All the World's Aeroplanes. Part C, All the World's Aero-Engines. Part D, All the World's Airships. Included in Part B are sections on Helicopters and Gliders. Many new types are described and illustrated, and altogether it is an excellent book.

Foreign Decorations

THE King has granted unrestricted permission for the wearing of the following decoration conferred by the King of the Hedjaz for valuable services rendered in connection with the War:—Order of El Nahda, 4th Class.—Lieut. (now Flying Officer) W. G. Stafford, M.C., D.C.M.

Two I.Ae.E. Papers

THE Minutes of Proceeding No. 10 just issued by the Institution of Aeronautical Engineers, includes full reports on two papers read recently before the Institution. The first of these, "Some Problems in Connection with the Structure of Rigid Airships," was read by Lieut.-Colonel V. G. Richmond, O.B.E., B.Sc., A.R.G.S., A.F.R.Ae.S., on January 25 last. The second paper, "Low Powered Flying," was read by Mr. W. O. Manning, A.F.R.Ae.S., on February 22 last. The discussions which followed each paper are also given. Copies of the Minutes of Proceedings, No. 10, may be obtained from the Secretary, Institution of Aeronautical Engineers, 60, Chancery Lane, W.C.2, price 1*s.* 6*d.*

Air Mails to Cologne.

THE Postmaster-General announces that from Saturday last, September 20, the early morning Air Mail to Cologne, closed at the G.P.O., London, at 3 a.m. has ceased. The Air Mail to Cologne, closed at the G.P.O., London, at 6.45 a.m. will be maintained.

Mishap to Wembley "Tattoo" Aeroplane

ON Friday night last one of the three aeroplanes taking part in the magnificent Military Tattoo just closed at Wembley, experienced engine trouble towards the end of its "performance." The pilot at once made for the emergency landing ground at Dead Man's Hill, not far from the Exhibition grounds. On landing the machine turned over, and the pilot and observer only just managed to get clear of the machine before it caught fire, owing, it is stated, to the shorting of one of the electric wires supplying current for the lamps used for outlining the machine. The latter was totally destroyed.

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SIDE-WINDS

THE Caxton Name Plate Manufacturing Co. notify us that they have moved from Caxton House, Westminster, to 11, 13 and 15, Rochester Row, Westminster, S.W.1.

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IN view of the number of unbranded motor spirits at present selling as No. 1, without any guarantee as to quality, the British Petroleum Co., Ltd., have decided to drop the numerical designations in connection with their three grades of petrol, and these in future will be known as "'B. P.' Aviation," "B. P." (for cars and motor-cycles), and "'B. P.' Commercial" for heavy vehicle use.

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